DECEMBER, 1951

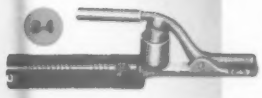
35¢

THE WELDING ENGINEER

IN THIS ISSUE: Big Week in Detroit . . . page 17

MAXIMUM CAPACITY AMPS	ROD SIZE	MODEL	PRICE *	DESCRIPTION	TONGS MADE OF	
300	1/4	A-1	5.50	INSULATED COPPER ALLOY MODELS	98% COPPER ALLOY HEAT TREATED FOR SUPERIOR STRENGTH HARDNESS CONDUCTIVITY	FULLY INSULATED
500	3/8	A-3	7.00			
500	3/8	A-3S	7.50			
300	1/4	AA-1	6.00	COPPER ALLOY MODELS WITH REPLACEABLE LOWER JAWS		
500	3/8	AA-3	7.50			
500	3/8	AA-3S	8.00			
300	1/4	TA-1	6.00	"QUIK-TRIK" DETACHABLE CABLE END		
500	3/8	TA-3	7.75			
300	1/4	A-W	6.60	"FEATHERLIGHT" MODELS	LIGHTWEIGHT ALLOY WITH REPLACEABLE COPPER ALLOY JAWS	
400	5/16	A-5S	7.75			
200	5/32	JH-2	5.50	"STREAMLINED" MODELS		
300	1/4	JH-3	6.60			
300	1/4	BT-3	6.00	BLADE-TYPE MODELS	STEEL BLADES INEXPENSIVE TO REPLACE	
500	3/8	BT-5	7.50			
300	1/4	B-1	3.25	ECONOMY MODELS	COPPER ALLOY	SEMI-INSULATED
500	3/8	B-3	4.00			
200	3/16	B-4	3.65		MALLORY 3 METAL	

* *All Prices Lower in Quantities*



This HOBART *Simplified* arc welder . . .

Saves time and money for you

How, you ask, can a Hobart Welder save me time and money? Well, it's like this. First, a Hobart is designed to make the welding operation as quick and easy as possible. With 1,000 volt-amp combinations, it's easy to get just the right welding heat. Remote Control lets you make fine adjustments right at the job —no returning to machine. All controls are convenient, easy to use. Secondly, a Hobart is so ruggedly constructed that it gives top performance, trouble-free service and long life even under the most severe use. We say you couldn't ask for more in a welder —but don't take our word for it. TRY A HOBART and decide for yourself.

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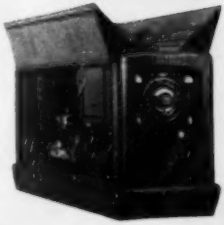
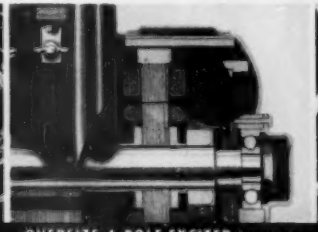


Above, Hobart Electric Drive Welder

Left, Hobart Gas Engine Drive Welder

All of these HOBART advantages come to you at NO EXTRA COST

POLARITY SWITCH is instant and positive—makes it easy to change from one type of electrode to another.



OVERSIZE 4-POLE EXCITER insures quick arc recovery and build-up—eliminates accidental polarity reversal.

PUSH BUTTON STARTING is convenient—fully protected against overload and power supply unbalance.

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DECEMBER, 1951

COVER: *Anchoring steel roof decking on the quarter-mile-long turbine building of the General Electric Co. at Schenectady, N. Y. The weldor is using an E-6010 electrode to fuse right through the decking to the purlins beneath it. All field connections in the G-E turbine building were arc welded.*

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Here's How To Assure Good Welding Fit-Up

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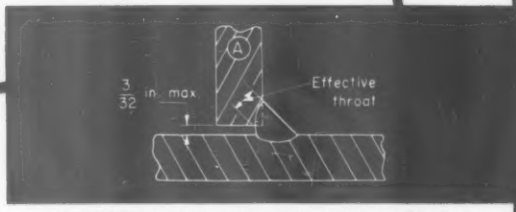


GOOD PRACTICE—Full throat size and strength are obtained when the fit-up gap is as much as 3/32 inches. The deposit penetrates the corner of Plate A as much as 3/32 inches. Larger gaps require excess welding.

SAVE TIME, POWER, ELECTRODES USE GOOD TECHNIQUES AND THE RIGHT ELECTRODE FOR THE JOB

Improper fit-up of joints to be metal arc-welded can slow production, waste man-power and electrodes, and increase costs at a tremendous rate. This is especially true of fillet welds on which the size of the fillet must be increased to compensate for poor fit-up if the joint is to have full strength.

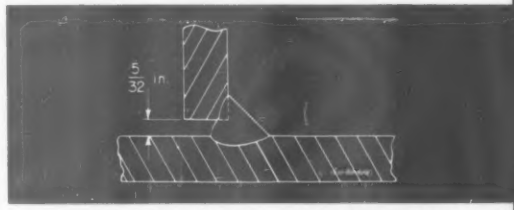
TO ASSURE GOOD FIT-UP:

1. DESIGN JOINTS CAREFULLY—give careful consideration to the type and size of joints to be welded; simplify fit-up by eliminating irregular contours wherever possible.

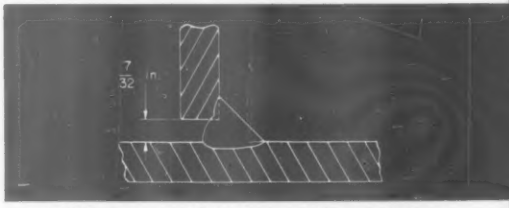
2. ALLOW FOR DISTORTION—otherwise excessive gaps may appear in the fit-up of unwelded joints as assembly progresses.

3. CUT AND SHAPE PARTS ACCURATELY—inaccuracy which results from haste or the use of machines improperly adjusted or in need of maintenance is one of the greatest single causes of poor fit-up.

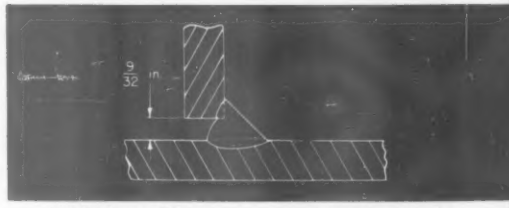
4. WELD IN PROPER SEQUENCE—weld least-contracting joints last, divide weldments into sub-assemblies, and weld outward from the center of a rigid structure.



WASTEFUL—With a 5/32-inch gap, a 3/8-inch fillet must be made to produce the strength of a 5/16-inch fillet. This requires approximately 50 per cent more time, power and electrode.



WASTEFUL—With a 7/32-inch gap, a 7/16-inch fillet must be made to produce the strength of a 5/16-inch fillet. This requires 100 per cent more time, power and electrode.



WASTEFUL—A 9/32-inch gap is a condition that ordinarily requires reassembling. If not refitted, it will require 200 per cent more time, power and electrode to produce the strength of a 5/16-inch fillet.

To Assure Yourself of the Best in Electrodes:

Insist on G-E electrodes. They give you high deposition rates, meet AWS specifications, and are available in a wide variety of sizes and types.

NEW! WELDING ELECTRODE SLIDE COMPARATOR

tells in an instant the AWS designation of manufacturer's electrodes.

See your G-E Welding Distributor for your comparator. Look for General Electric under "Welding Equipment" in the yellow pages of your telephone directory. And remember, he carries a complete line of G-E welders, electrodes and accessories.

GENERAL ELECTRIC

712-10

NEWS FROM WASHINGTON

Browning New Chief Welding Eqpt. Section

WILLIAM B. Browning took over his new job November 1 as chief of the Welding Equipment Section, Metalworking Machinery Division, NPA. Browning joined the section about four months ago as gas welding equipment specialist, on loan from the Linde Air Products Co.'s Birmingham office. He replaces Dale D. Spoor, former chief of the Welding Equipment Section, who was promoted, as of the same date, to Chief, Industries Branch, Metalworking Machinery Division, NPA.

W. B. (Bill) Browning, on leave from Linde Air Products Co., has been promoted to Chief, Welding Equipment Section, NPA

Guarantee Structurals for Plant Expansions

DPA HAS announced that the steel and aluminum expansion programs will be supplied with 100% of their structural requirements in the first quarter of 1952. This represents a change in policy to a certain extent: the aluminum program did get 100% in the fourth quarter, but the steel people got only 51% of their stated requirements. In addition, other important expansion programs are expected to get high percentages too.

Of course, this can only mean that the liberal treatment of the expansion programs will leave only minor quantities of structurals for commercial and recreational construction.

All this brings us back to what we have been saying all along—that the easiest way to save at least 10% of the steel required is to use welded construction.

DPA Tightens Up on Basic Materials

ISSUE No. 3 of DPA's "List of Basic Materials and Alternates," recently issued, reflects tightening in the supplies of such materials as steel and copper, along with some easing of non-defense materials.

Copper supplies, it is pointed out, are almost dangerously low as a result of strikes, scrap shortage and low imports. Tin stocks are also low, and production of lead, zinc and aluminum is not up to the desired level. Along with these five metals on the "most critical" list are tungsten, nickel, molybdenum, columbium, cobalt and platinum.

About 400 materials are classified in three groups in the new issue of DPA's List. Group 1 includes those which are "insufficient for defense and civilian demands." Group 2 lists materials which are in "approximate balance" with demand, and expanded use of which should be avoided. Materials in Group 3 are in "fairly good supply," and they should be used wherever possible as alternates for items listed in Groups 1 and 2.

Copies of the "List of Basic Materials and Alternates" are available at district and regional offices of the Department of Commerce.

Imported Pig Lead Supplies Allocated

IMPORTED pig lead, which normally comprises about a third of the nation's total pig lead supply, has been put under allocations by NPA. This step is expected to allow all pig lead users to share proportionately in the imports, rather than leaving the supply of imported lead in the hands of a few consumers, as has been the case until now.

NPA's action, which takes the form of an amendment to Order M-76, requires that no person accept delivery of domestic or imported pig lead except as it is allocated to him by NPA. Pig lead importers must notify NPA 15 days before the first of the month in which the shipment is to reach them the size of the shipment, its grade, and its point of origin.

Expect Sharp Cut in Tin Allocations

YOU CAN look for a substantial reduction in 1952 first quarter allocations of tin plate and bronze products under the Controlled Materials Plan. The decision to reduce the amount of tin consumption came as a result of the government's decision to stop buying foreign tin at "exorbitant" prices.

Quotas and Ratings Go with Sale of Firm

IF YOU are selling or buying a company which has priority ratings and allocations from NPA, you will be interested in NPA Regulation 6 issued on Nov. 5 regarding their transfer along with all other assets and obligations. NPA has ruled that the buyer of a going concern must operate it as substantially the same business and at the same location in order to acquire all the privileges the previous owner had been granted by NPA. Otherwise he must secure written official permission to do so from NPA.

Issue New Priority, Allotment Symbol List

RECENT additions and changes have made it necessary for DPA to issue a revised list of allotment numbers

and symbols and DO symbols for use by all Federal claimant agencies. This list is used in authorizing production and construction schedules and in allotting controlled materials.

This replaces the list issued Oct. 9, 1951. Copies can be obtained from DPA, New GAO Bldg., Washington, D. C.

Machinery Ceilings Allowed New Increases

IF YOU manufacture machinery or general merchandise, here's another chance to revise your price ceilings upwards.

OPS has finally issued regulations modifying the Controls Law to conform with the recently enacted Capehart Amendment to the Defense Production Act. This amendment was bitterly denounced by the administration as "terrible" and "unworkable." In fact, OPS administrator predicts immediately higher price ceilings and eventually higher prices too.

These actions, effective Nov. 9, are Suppl. Reg. 17, and Amend. 33 to CPR 22, as well as Rev. 1 to Suppl. Reg. 1, Amend. 20 and Suppl. Reg. 4, all to CPR 30, and are based on a "pre-Korea plus" basis. They protect, up to last July 26, the unit profit which a manufacturer had during his pre-Korean base period as well as allowing for increases in overhead costs, such as sales and advertising expenses.

Auto Wreckers' Stocks Surveyed for Scrap

THE AUTO-WRECKING industry has been asked to supply one million tons of steel scrap to prevent shutdowns this winter in the steel industry. So NPA has proposed—and the Auto Wreckers' industry advisory committee has opposed—an order to limit inventories of cars in wreckers' yards to no more than a 90-day supply in order to force scrap steel back to the foundries. The committee members, while they agreed that millions of tons of steel were lying useless in junk yards, objected that the 90-day stock limitation would increase the competition for junk cars and raise prices to prohibitive levels. Instead, they urged a 120-day, 500-car limit.

The industry estimates that at this time there are some two to three million cars suitable for scrapping that are now on dealers' lots. Usually, scrapped automobiles can be counted on to supply about a million tons of scrap to the mills during the fall and winter. This year, NPA has asked that the amount be doubled, in view of the critical need. Unless voluntary measures can bring forth the additional needed amounts of scrap, condemnation proceedings might become necessary. In this event the government would requisition entire yards of wrecked cars and scrap them, NPA warned.

"DO" Rating Use to be Curtailed

SO BADLY snarled and overused has the present DO rating system become that NPA has announced plans to curb it somewhat. Precisely what steps are to be taken in this direction had not been disclosed at presstime, but some idea can be obtained from a typical problem caused by the present system.

A manufacturer of desks who fastens them with nails (a CMP item) can use a DO to hurry through a lumber order, even though lumber isn't on the scarce list. A desk manufacturer who uses screws (not on the CMP list) doesn't rate a DO and must wait his turn on the lumber.

One proposed solution is that DO ratings be limited, in consumer durable goods manufacturing, to materials needed to keep the plant running. Another plan calls for severe limitation of the power to apply DO ratings by some manufacturers, with use limited to cases where the supply of steel, copper or aluminum would be a limiting factor. Thus, in the case of the desk manufacturer who uses nails, he would continue to receive a CMP nail allotment, but he could not use a DO rating for lumber or varnish since he could at any time substitute screws or pegs for the nails, and the nail supply would not be limiting his production.

Still a third (and toughest) approach is that DO ratings are to be used only in connection with military and atomic-energy programs in ordering many consumer durable goods.

Business Advisory Center Transferred

NPA's Business Advisory Center announces a simultaneous change in location and change in name. Under its new title, the Business Advisory Service, it will carry on in the New General Accounting Office Building, second floor, main corridor, Room 2-N-6. Before the transfer, the office was located in the Old GAO Building.

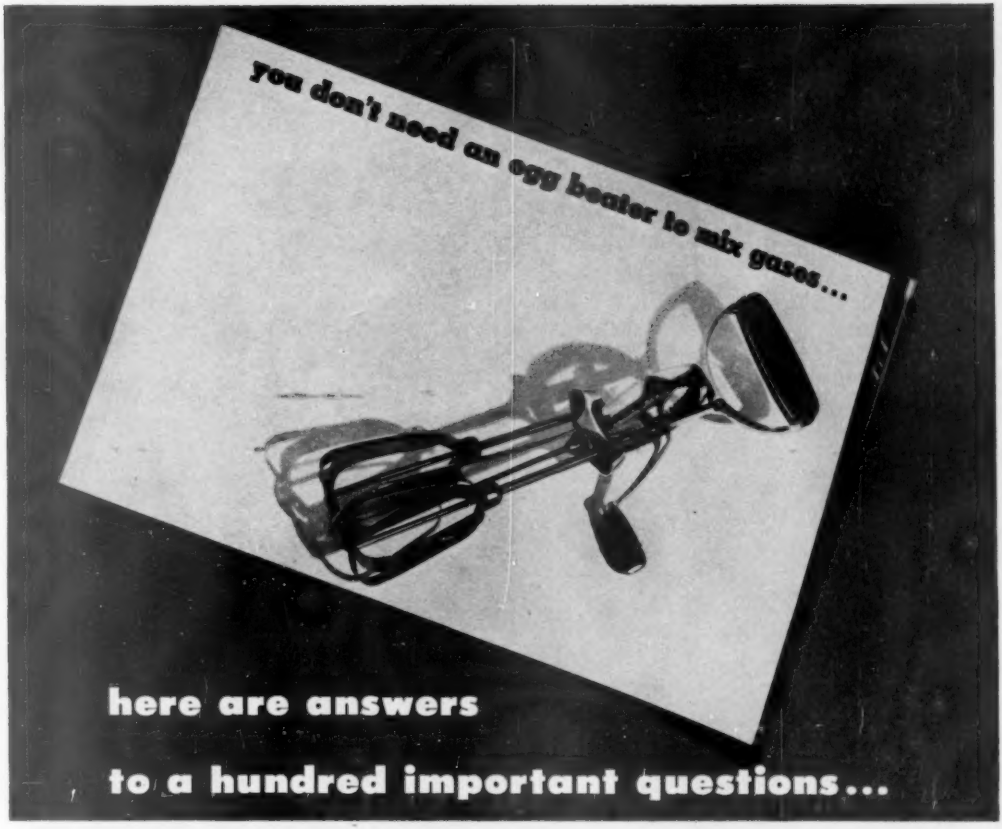
In its new quarters, the Service, with its staff of technical and business advisors, will continue to advise businessmen, manufacturers, and their representatives on problems arising from orders and regulations NPA and DPA.

Also moved to the New GAO Building was the Information and Publications Issuance Unit. The Receptionist Center remains in the lobby of the Old GAO Building, however.

Pamphlet on Machine Tool Lubrication

LUBRICATION materials and methods is the subject of a pamphlet recently issued by the Office of Small Business of NPA. This pamphlet, one in a series of defense production aids designed to help the small manufacturer during the national emergency, urges the adoption of planned and regular lubricating practices by all shops. Such a program can do much to help lengthen the useful life of machine tools.

Specific suggestions are offered for the selection of lubricants, their storage and their proper use for oiling and greasing different parts of machine tools.



Would you like answers to questions such as these?

- what is gas and how does it behave
- how do gases mix in a torch
- what are the more important flame temperatures
- which is hotter — the oxydizing or carbonizing flame
- why do some flames heat rapidly and others slowly
- can you guess the speed of a gas molecule

Would you like to see full color pictures of seven different flame types?

The answers to these questions are but a sample of the interesting information this booklet brings to you.

Do write now for your *FREE* copy.

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Please send FREE booklet "you don't need an egg beater to mix gases"

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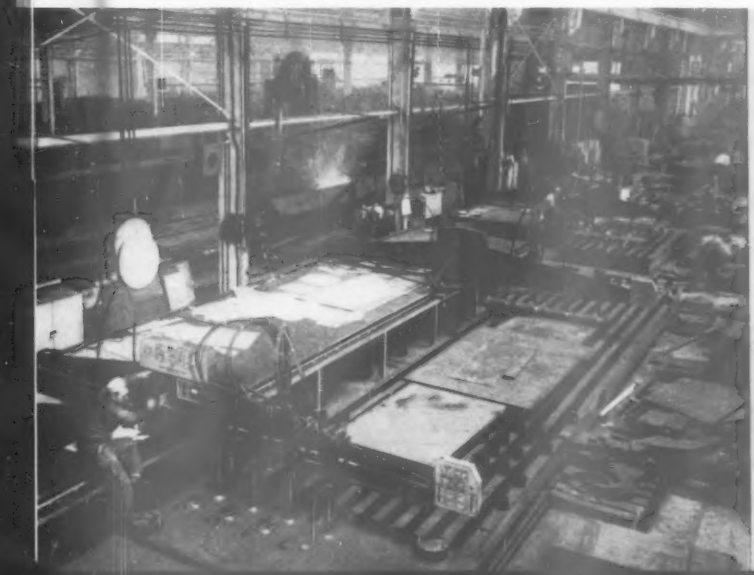
814

Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California

After 69 years of service, famous old Brooklyn Bridge is being remodeled. The bridge is being strengthened with new metal and roadways are being widened to provide additional traffic lanes. In this picture NCG's Torchweld "75" Cutting Torch and NCG gases are being employed in the demolition of the north roadway. "Time is an essential factor in this job and NCG equipment and gases have played an important part in speeding up the work," states Arthur J. Klevens, Vice President, J. K. Welding Co., contractors handling this mammoth rebuilding job for New York City's Dept. of Public Works.



Three NCG automatic flame cutting machines help speed production at the Whiting Corporation, Harvey, Ill., one of the nation's leading producers of foundry and railway equipment, material handling equipment, rotary shears, chemical equipment and special machinery. Two of the machines are mounted on one long table to provide a 40-foot cutting length. Parts being cut in this picture are for Whiting's new "Trackmobile." Whiting has used NCG cutting equipment for ten years.

AT RIGHT: Rego KX Hand Cutting Torches and NCG's Cut-O-Matic and RS Cutting Machines speed production at Welded Steel Shapes, Inc., structural steel fabricators at Coatesville, Pa. NCG's pipe-line system, fed from portable banks, keeps NCG gases flowing conveniently and economically at this modern shop where work ranges from the fabrication of buildings and bridges to farm equipment.

Get it done faster and better with **NCG**

In plants and shops across the country NCG equipment is proving that it can get work done more profitably

In times like these when all basic costs are high, one of the solutions for profitable production is selecting tools that will help get jobs done easier, faster and better—that can be depended on, too, to stand up under heavy use without costly maintenance.

NCG customers from coast to coast are getting this profitable kind of help from NCG equipment. You can get it, too!

Whatever your needs are for welding or flame cutting equipment, find out what NCG has to offer before you make a choice. Your nearest NCG office or the authorized NCG dealer in your locality is able and anxious to help you. And you'll like the interest they take in making your problems their own.

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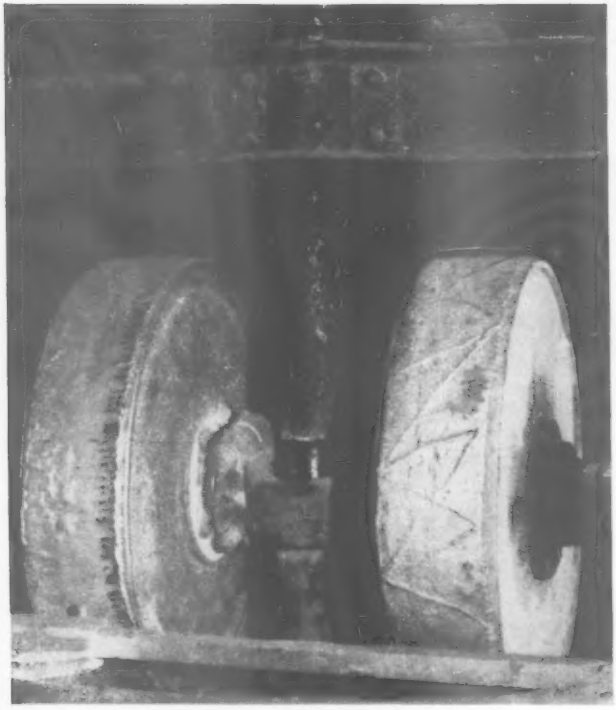

6 Years on the Rock Pile ...and STILL SERVING TIME!

These hard-faced rock-crusher rolls have already outlasted unprotected rolls 12 times—and they are still in operation.

The hard-faced rolls on this rock-crusher mill have been in constant operation for six years. During this time, the rolls have been pulverizing such abrasive materials as ferro-alloys, ore, dolomite, feldspar, rock, sand, and clay used for making brick. Unprotected rolls, performing the same operations, had to be replaced every four or five months.

The serrated roll shown at the right in the photograph is the roughing roll used for initial grinding or milling. The smoother roll, at the left, is a finishing roll used to grind the abrasive materials into a powder. Both rolls were hard-faced with HAYNES STELLITE alloy by the metallic-arc process to protect them from abrasion.

The new 40-page booklet, "HAYNES Alloys—Hard-Facing Manual," gives the whole story on hard-facing. It includes information on what metals can be hard-faced, how to select the right HAYNES hard-facing material, step-by-step application procedures, and a list of typical industrial applications with recommended rods for each. If you would like a copy of this booklet, write to our nearest district office.

HAYNES TRADE-MARK *alloys*

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ARC-DRIVE CONTROL
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. . . INSTANTANEOUS RESPONSE TO ARC-LOAD CHANGES

. . . INSTANTANEOUS RECOVERY

. . . REDUCED ARC BLOW

. . . COMPLETELY ADJUSTABLE BY OPERATOR

Westinghouse RA Welders with new positive arc-drive control now prevent shorting when used on "drag" welding applications. In addition, they allow complete penetration on root passes of vertical and overhead welds. Arc-drive control is obtained by adjusting the ratio of short-circuit current to welding current without changing open-circuit voltage. Actual amount of arc-drive current can be varied by the operator.

For information on this improved RA Welder or other Westinghouse Welding Equipment, write Westinghouse Electric Corporation, Dept. DC81, Welding Division, Buffalo, New York.

J-21607

You can be sure ... if it's Westinghouse

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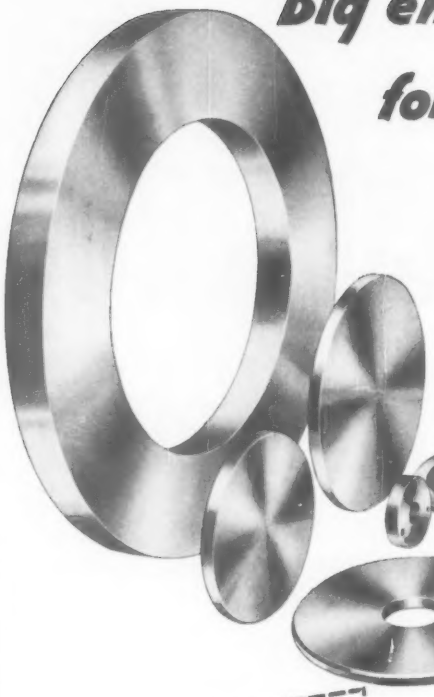
Big enough...Tough enough for your hardest job...



MALLORY Seam Welding Wheels

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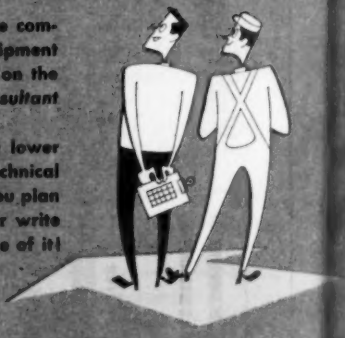

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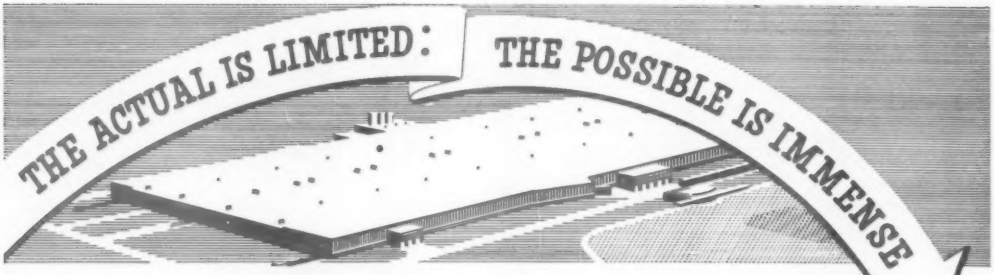

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Welded design builds stronger products

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THE proper use of welded steel strengthens the construction of many products while cutting costs 50%.

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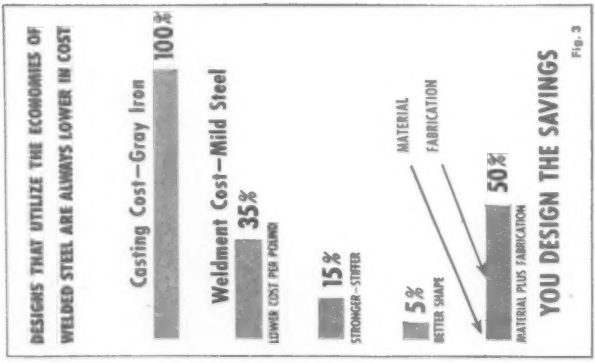
Whenever weldment costs do not approximate this yardstick, designs generally are falling short of incorporating the full economies of welded steel. A Lincoln Welding Engineer will gladly demonstrate how you can benefit on present and future product developments. Call or write.



PROPER DESIGN IN WELDED STEEL ALWAYS IMPROVES PRODUCT AND LOWERS COST

Fig. 1—Original Construction *of hanger. Cost....$5.20. Weight 18 pounds.*

Fig. 2—Present Weldesign in Steel *Saves 52% in cost. Costs....$2.50 Weighs 12 pounds.*

Photos courtesy Dorsey Trailer Company, Elba, Alabama.

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CLEVELAND 17, OHIO

ESTABLISHED 1916 THE WELDING ENGINEER DECEMBER, 1951

In Our Hands

OUR BIG problem is to keep the United States the best country on earth in which to live. You wouldn't think that the "ism" groups would have any success in their persistent attempts to change our way of life, but strangely enough they are finding support in this country, even within our federal government.

Millions of people in the world today could tell us that we Americans have not learned to appreciate the blessings of freedom. These unfortunate sufferers under despotic governments have had to find out the hard way that freedom is very, very easy to lose. And very difficult to regain.

Freedom is an individual responsibility—as much the responsibility of a plant weldor as of the President of the United States. Both the weldor and the President must act together to keep America a free nation. If the President has other ideas than that, then it's up to the weldor and millions of other workers to bring him back into line.

The big difficulty is that not many of us know how to go about this task, nor why we should undertake it. That is why the Inland Steel Co. and the Borg Warner Corp. are to be congratulated on their joint effort to make the cause of freedom and the economic conditions involved easier to understand. These two concerns have produced a series of four thought-provoking films entitled, "In Our Hands."

The thought behind this commendable educational program is that if we understand how America became strong and prosperous in the first place, we will understand how to keep her that way.

WHAT has made the United States great is simply the incentive afforded by freedom. A free man is free to do bigger and better things; the inhabitant of a slave state is not. What the incentive to produce has led us to accomplish is vividly portrayed in "In Our Hands."

Man without any tools, with nothing but his bare hands, was very lucky to stay alive. Even with crude tools, he had to work from sun-up to sun-down to scratch out a living. Being free to improve his tools, however, he produced more and better things—also things to exchange for other things that he couldn't make himself. His standard of living increased in direct ratio to the quantity and quality of his tools.

TO THE carpenter, the word "tool" calls up a mental image of a hammer, plane or saw; to the weldor a torch, to the machinist a hacksaw, and so on. These are all tools, of course. Yet human energy accounts for only 4% of the work done in America today, animal energy only 2%. The remaining 94% of the work is accomplished by power tools.

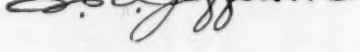
Every great plant in America houses a combination of such energized tools as huge presses, heat-treating furnaces, welders, milling, planing and boring machines and many others. The tools of just one plant frequently cost several million dollars.

In our system of private competitive ownership, these tools come from the investment of the savings of thrifty people. The word "corporation" is merely another way of saying, "a method of ownership by thousands of small savers." However, the real boss of the corporation in America is not the management nor the owners but the customer.

The customer is boss because without him both plant tools and workers will stand idle. The highest standard of living, the greatest degree of security is attained when the owners and the users of tools work together to win and hold the customer.

If we want to go on living the way we are doing, we must not sell out our freedom to work, to grow things and to make things; our freedom to buy and to sell; our freedom to save and to invest. These are the freedoms that have made America great, but unless we learn to realize their value we won't have them any more.

History shows us that if we don't fight for freedom, we are likely to lose it by default. It is in our own hands.



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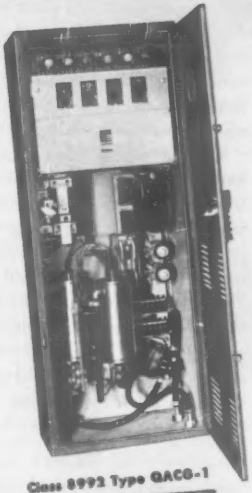

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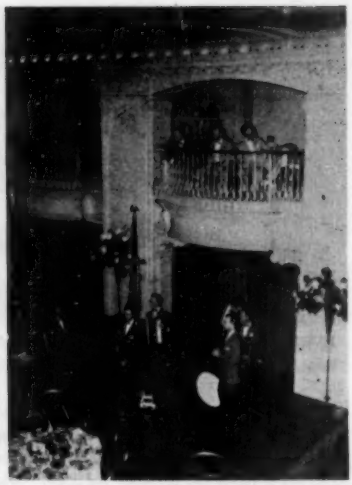


ANNUAL BANQUET was an evening of fun and frolic for the 550 AWS members (and wives) attending this deluxe affair

Big Week in Detroit

"One of the best ever held," seemed to be the general opinion of the Detroit convention of the American Welding Society

BY CLYDE B. CLASON

THE 32nd annual meeting of the American Welding Society suffered from a bad defect in programming, but was one swell affair for all that. Technical sessions were well run, technical papers (for the most part) had meat on them, and the social side of this Detroit meeting was truly marvelous. Anybody who didn't have a good time during the five days from Oct. 14-19 is a curmudgeon born beyond the pale of common humanity.

As far as the writer is concerned, the only fly in the ointment was that not one free morning, afternoon or evening was left for a visit to the Metal Show. Your reporter strongly recommends that this programming defect be corrected for next year's Philadelphia meeting.

Attendance Up Again

Registration was around 1,650 which compares most favorably with last year's Chicago registration of 1,375 and not too badly with the 1,775 attendance achieved two years ago in Cleveland. Particularly gratifying was the attendance at the annual banquet, for which 550 tickets were sold at $7.50 each.

And speaking of the annual banquet, held Thursday evening in the grand ballroom of the Hotel Book-Cadillac, it was one of the very best of such affairs. The dinner music of Jack Qualey's orchestra, the story-poems of that grand old man Eddie Guest and the amusing toastmastering of Vaughan Reid blended together into a memorable evening.

Another never-to-be-forgotten social event was the president's reception at the cocktail hour on Monday. This was preceded by an open assembly providing an opportunity to weld friendships with foreign visiting members of the International Institute of Welding and the World Metallurgical Congress. Representatives were on hand from Norway, Sweden, Germany, Japan, China (Nationalist), Italy, Portugal, France, Belgium, Switzerland and Holland. These visitors spoke excellent English, and it was a real treat to have the opportunity to converse with them. Incidentally, all to whom the writer talked were unanimous in their praises of American industry. Most of them also liked the American way of life and were convinced that Communism could not endure for one minute if Communist peoples were to be given the opportunity to see what life could be like outside of the Iron Curtain. Said one particularly engaging Frenchman: "You Americans are entirely too modest; you don't tell the rest of the world enough about you." Maybe there's something in that criticism.

Prize Awards

Awards of prizes and medals were made during the annual banquet, with retiring president Harry W. Pierce officiating as master of ceremonies. H. V. Beronius, Jr., president of the Resistance Welder Manufacturers' Association, presented the RWMA awards, totaling $2,250, to the authors of prize-winning papers.

W. L. Roberts, research engineer, Westinghouse Electric Corp., East Pittsburgh, won the $750 top award in the industrial source classification for a paper titled "Resistance Variables during Spot Welding." Second prize of $500 was awarded to D. H. Fleig, American Electric Fusion Corp., for a paper on "Design and

EVERY CONVENTION begins at the registration desk; this year's attendance was up—over 1,650 registered

ASSEMBLY held prior to the president's reception provided an opportunity to meet the foreign visitors

Operation of High-Speed Production Tube Mills." C. S. Seltzer, Swift Electric Welder Co., Detroit, received the $250 third prize for a paper on seam welding cylinders automatically (page 38).

Engineers from the Rensselaer Polytechnic Institute won both prizes for the best papers from a university source. Dr. Ernest F. Nippes and John N. Ramsey were selected the winners of the $300 first prize for their paper "Spot Welding of Scaly Heavy-Gage Structural Steel." Dr. Nippes, with co-authors J. M. Gerken and J. G. Maciora, also won the $200 second prize for a paper on the projection welding of steel sheet 0.010 and 0.020 in.

William H. Colbert, a mechanical engineering senior of the University of Cincinnati, won the $250 undergraduate award with a paper entitled "Resistance Welding."

A. F. Davis Undergraduate Welding Awards were presented by Professor Robert S. Green, of Ohio State University, chairman of the AWS educational Committee. Edwin L. Marshall, of New York University, and Stan Spaulding, of Purdue University, were selected as winners of the $200 first prize and the $150 second prize, respectively. The N.Y.U. *Quadrangle* and the *Purdue Engineer* were also awarded $200 and $150 prizes for publishing the winning papers.

The 1951 Lincoln Gold Medal was awarded to W. H. Bruckner, research associate professor of metallurgical engineering at the University of Illinois. The presentation was made by C. E. Jackson, chairman of the AWS Committee on Awards.

Henry Neitzel National Membership Awards were presented by Donor Henry C. Neitzel, chairman of the 1949-50 and 1951 National Membership Committees. The bronze plaque for the greatest net increase in number of members was won by the Houston section with 57 new members. The plaque for the greatest net increase in percentage went to the Peoria section, which showed a gain of 82.5% in membership.

The most dramatic of the award presentations was that of the Samuel Wylie Miller Memorial Medal and Certificate to 75-year-old Casin W. Obert for "four decades of creative contributions to the art and science of welding." This presentation was made personally by President Harry W. Pierce. Mr. Obert is engineering consultant for Linde Air Products Co. His charming daughter and his grandchildren were on hand to watch him receive the very great honor.

President Pierce also presented the Adams Lecture Honorarium and Certificate to John J. Chyle, director of welding research of the A. O. Smith Corp., Milwaukee.

Adams Lecture on Copper

This year's Adams lecturer, Mr. Chyle, is notable for many things, among which is the invention of the first extruded all-position type of electrode of the cellulosic titanium dioxide type, now classified as the AWS-ASTM E-6010 electrode. The ninth Adams lecture, delivered Tuesday evening, was on the subject of copper welding by the inert-gas method. The first users of copper, said Mr. Chyle, were the Chaldeans and their predecessors back in the years 5,000—4,000 B. C. Though copper was among the earliest of metals to be worked (and probably the first to be worked for purely practical purposes such as spears, arrow heads, knives, axes, etc.), the problem of welding it in a satisfactory manner was not truly solved until the advent of the inert-arc process just a few years ago. Mr. Chyle confined his talk chiefly to the welding of three types of copper: tough pitch copper, phosphorous-deoxidized copper and oxygen-free high-conductivity (OFHC) copper. Six types of filler metals were tested: OFHC, tough pitch, phosphorous-deoxidized, silicon-deoxidized, silver-bearing and tin-bearing coppers. Copper contents of these various alloys ranged from 98.80 to 99.99%.

Equipment used was an inert-arc welding torch, either helium or argon shielding gas, and ⅛ or 3/16 in. tungsten electrodes. With tungsten electrodes, the best results were obtained with d-c negative polarity. Helium was found to be the best shielding gas as argon required the plates to be preheated. Arc voltage was found to be consistently higher for helium than for argon.

Mr. Chyle's generally excellent talk was enhanced by many beautiful slides of weld macrographs reproduced in their natural colors.

Symposium on Jet Alloys

Wednesday evening was featured by a Symposium on the Welding of Jet Engine Alloys, sponsored by the Detroit AWS section under Keith Sheren, chairman. A. E. Lindsey, Dix Engineering Co., served as chairman of the symposium, and Walter Garman, General Electric Co., as co-chairman. Excellent papers were given by A. J. Rosenberg, General Elec-

HOMER MORRISON (left), chairman of Convention Committee, and Eric Seabloom, new second vice-president

OTHER OFFICERS in reception line (left to right): Fred L. Plummer, Charles H. Jennings, Harry W. Pierce

tric Co., Lynn, Mass.; R. L. Peaslee, Wall Colmonoy Corp., Detroit, and Dr. I. A. Oehler, American Welding and Mfg. Co., Warren, O.

Mr. Rosenberg discussed the spot and seam welding and inert-arc welding of "materials that continually retain their strength over a wide range of temperatures." Such materials include columbium-stabilized, tantalum-stabilized and titanium-stabilized stainless steels, Inconel W and Inconel X and Stellite alloys 25 and 88 for higher temperature service. Contrary to what is generally believed, titanium is not a promising alloy for high-temperature service since it has a marked affinity for oxygen, hydrogen and even nitrogen at temperatures in excess of 1,000 F.

Mr. Peaslee told of an unusual nickel-chromium-boron brazing alloy that is able to withstand temperatures of up to 2,000 F. Assemblies of many parts can be fitted together and brazed as a unit in a furnace with a dry-hydrogen atmosphere. One heat treatment mentioned was to braze at 2,150 F for 30 minutes, followed by aging at 1,400 F for 16 hours. The physical properties of such brazed assemblies are said to approach the strength of the parent metal over a temperature range extending up to 2,000 F.

Dr. Oehler, who is to be commended for his ability as a public speaker, contended that the circular components in a jet engine present a natural application for flash welding. No revolutionary change in technique is necessary, he declared, to go from carbon steels to the heat-resisting alloys. However, the latter alloys are weldable only over a rather narrow range of welding variables. It is good practice to flash at very near the lowest voltage that will maintain an arc. Preheat is most desirable: this is effected by bringing the pieces together with a light contact immediately prior to the flashing cycle. Considerably greater pressures are necessary to upset the heat-resisting materials —around 35,000 psi as compared to 8,000 psi for carbon steels. The reason for this is simple: the heat-resisting alloys are made to retain their strength at elevated temperatures. Postweld annealing considerably improves the properties of most welded joints in the heat-resisting alloys. Most specifications require the flash welds to have 95% the strength of the parent metal.

Symposium on Filler Metal

Two other symposia were featured during the 32nd AWS meeting. The symposium on metallizing was allotted to one of the technical session periods and will be discussed along with those sessions. The second symposium, scheduled for Thursday afternoon, was sponsored by the AWS-ASTM Committee on Filler Metal to discuss the highly important subject of filler metal specifications for inert-gas and submerged-arc welding. Some 20 experts participated.

Purpose of this symposium was to answer the three basic questions: (1) Is a filler metal specification necessary? (2) If so, what are the pertinent factors which should be included in such a specification? (3) Why are these factors necessary and how should they be controlled by specification? Metals for which the answers were to be found were: aluminum and magnesium; stainless steels; copper and copper alloys; mild and low-alloy steels.

G. O. Hoglund, Aluminum Co. of America, led the discussion of aluminum and magnesium. Most of the witnesses called upon were of the opinion that specifications were necessary for aluminum, but considerably divided in their opinion as to the pertinent factors that should be included. For magnesium, the feeling seemed to be that adequate specifications already exist.

Discussion of stainless steel was led by R. David Thomas, Jr., of Arcos Corp. Here two distinct schools of thought emerged; one that specifications should be developed immediately for the bare stainless wire used in submerged-arc, atomic-hydrogen and inert-arc welding and the other school that we don't know enough yet to do this job.

General discussion of the copper and copper-alloy problems was led by F. E. Garriott, of Ampco Metal, Inc., Milwaukee, and of the mild and low-alloy steels by David Swan, of Union Carbide and Carbon Research Laboratories, Inc. O. R. Carpenter, of The Babcock & Wilcox Co., was chairman of the Filler Metal Symposium, and J. H. Humberstone, of Air Reduction Co., Inc., served as co-chairman. The session should provide the Filler Metal Committee with a vast amount of evidence to take into consideration when it formulates the particular specifications involved.

The Educational Lecture Series was repeated this year for two afternoon periods from 4:30 to 6:00 p.m. Robert S. Green, associate professor and chairman of the department of welding engineering at Ohio State University, served as chairman for

JOHN J. CHYLE, A. O. Smith Corp., Milwaukee, did a very good job with the ninth Adams lecture

W. R. PLUMMER, vice-president, Progressive Welder Co., Detroit, gave the two educational lectures

HIROSHI KIHARA, president of Japan Welding Society, traveled from Tokyo to talk spot welding

the two lectures, both of which were delivered by W. R. Plummer, of Progressive Welder Co., Detroit.

Mr. Plummer's subject was: Product Design for Resistance Welding. The theme of his course was that rather than use welding to simplify design, we should use design to simplify welding. Among other points, he brought out the fact that most designers leave too little flange clearance for spot welds. He also gave as a good rule-of-thumb to leave at least 2 in. between spots to avoid shunt currents. Moreover, thin sheets should be welded to thick material, not vice versa.

At the annual business meeting, held Thursday afternoon, Oct. 18, Harry W. Pierce, the retiring AWS president, was presented with a silver-mounted walnut gavel in addition to the usual past president's pin. Mr. Pierce was also the first president of the American Welding Society to be given an honorary life membership upon retirement from office.

The Technical Sessions

One good thing about the 1951 convention was that the number of both technical sessions and papers was down from last year's monstrous 24 sessions and 87 papers. This year's program committee did a more intelligent job by scheduling only 70 papers, given in 21 sessions. Even 70 papers, however, is too large a number to cover in a condensed report of this nature. We'll just have to pick out a few highlights here and there, and if any authors are omitted it is not because we are deliberately trying to slight them.

Since the names of session chairmen and co-chairmen were given in the October issue of The Welding Engineer (as well as in the convention program), they will not be repeated here.

In the Monday morning structural welding session, the paper by C. H. Yang, L. S. Beedle and Dr. B. G. Johnston contained a part of the results of a series of continuous beam tests made to determine how various factors affect the behavior of bending members in the plastic range. The assumption of a uniform distribution of plastic strain in bending members is far from the actual picture, according to the experimental data.

The paper by R. E. Somers and H. C. von Blohn, both of Bethlehem Steel Co., described a study of the practice of welding minor surface imperfections in structural steel before delivery by the manufacturer. Comparative tests were made of two electrodes: AWS E-6012 and low-hydrogen E-6015. Conclusion was that most welding done on silicon or ordinary structural grade steel should be done with low-hydrogen electrodes to avoid underbead cracking. No underbead cracking was found in Mayari R steel or Navy high-tensile steel with either type of electrode.

The paper by Charles F. Frantz, Lehigh Structural Steel Co., discussed the estimating of weldments and welded structural steel. Some fabricators say welded construction costs 10% less than riveted; others are not so sure, but it is generally admitted that the overall cost of welded construction is under that of all-riveted. Avoid riveting *and* welding on the same structure, Mr. Frantz advised; it is poor economy.

In the Monday morning resistance-welding session, the paper that probably attracted the most interest was one on the spot welding of commercially pure titanium, discussed by Frank W. McBee, Jr., one of three co-authors at the University of Texas. McBee and his cohorts, M. L. Begeman and J. C. Fontana, used a 75-kva spot welder with controls for current duration, current amplitude and sequencing operations. They found no particular welding problems as both the current range and the time range proved to be rather wide. In a series of 400 consecutive welds, there was essentially no decrease in weld strength; indentations remained uniform and no pick-up was observed on the electrodes. The investigators concluded that for spot welding, at least, titanium is comparable in weldability with stainless steels. Not comparable, however, is its cost of around $20 per lb.

William E. Klingeman, of Precision Welder and Machine Co., described a new tool that he thought could be used for joining both ferrous and non-ferrous metals. This is a welder with electromagnets to vary the tip force as the contact resistance varies. The method has been tested for magnetic forces of from 50 to 3,000 lb. Currently, the process is being used commercially to weld fine silver, coined silver and tungsten in electrical contacts. Mr. Klingeman emphasized that the new method is not a replacement for conventional spot and projection welding, but a device to apply to critical welding problems

EDGAR A. GUEST (at microphone) with Vaughan Reid, who served as toastmaster at the annual banquet

AT JET-ENGINE SYMPOSIUM, left to right: Keith Sheren, of Detroit AWS; A. E. Lindsey, symposium chairman; Walter Garman, co-chairman; and the chief speakers: Dr. I. A. Oehler, A. J. Rosenberg and R. L. Peaslee

such as the welding of tungsten to steel.

Tom Piper, of Northrop Aircraft, Inc., gave as his opinion that the aircraft industry is faced with a narrow scope of vision on the application of spot, seam and roll-spot welding to aircraft design. He cited as an example a company that was forced to discontinue a spot-welded wing and shift to a much heavier riveted wing, for no particular reason as far as engineering considerations were concerned.

The fourth paper of the session was co-authored by Myron Zucker, of the Myron Zucker Engineering Co., Jerry Geralds, of Midwest Wire Products Co., and Paul Duker, of The Detroit Edison Co. It represented the combined thinking of an engineering consultant, a manufacturer and a power company man on machine set-up and operating practices for a factory making welded-wire products.

Monday Afternoon

Resistance welding continued in an afternoon session at which three more papers were presented. The RWMA prize-winning paper of C. S. Seltzer, on the automatic seam welding of containers, is abstracted in this issue, beginning on page 38. Julius L. Solomon, research director of Sciaky Bros., Inc., discussed the spot and seam welding of Nimonic, Inconel X and other high-temperature materials used in the flame tubes and discharge nozzles of jet-aircraft gas turbines. D. L. Knight, of National Welding Machine Co., read a prepared discussion in which he took sharp issue with Mr. Solomon's claims that three-phase equipment could do a better job of welding such materials than single-phase equipment. William J. Farrell, sales manager of Sciaky Bros., spoke in Mr. Solomon's defense.

No argument at all arose over the paper by Dr. Ernest F. Nippes, W. F. Savage, J. J. McCarthy and S. S. Smith, all of Rensselaer Polytechnic Institute, on the temperature distribution found during the flash welding of 1020 steel with a 300-kva hydraulically operated flash welder. Everyone seemed to be in agreement that this was a highly meritorious piece of research. The quartet of Rensselaer men inserted 2,100 thermocouples into 300 samples to get the data from which they plotted 28,000 points.

An excellent non-ferrous session was also held on Monday afternoon. A quartet of research men from the department of civil engineering of the University of Illinois—R. J. Mosborg, R. W. Bohl, F. L. Howland and W. H. Munse—discussed metallurgical studies of welded copper joints. The test welds were made on deoxidized copper, tough pitch copper and OFHC copper and were tensile tested at temperatures of 75 F, -321 F and 400 F. The ultimate tensile strength was found to increase 60% when the temperature was lowered to -321 F and to decrease 30% at 400 F.

F. Emery Garriott, Weldrod Dept., Ampco Metal, Inc., told about ways to weld iron-bearing alpha aluminum bronze. This new postwar material was developed to provide a copper-base alloy combining high strength, good workability and high resistance to corrosion, erosion and wear. The carbon-arc process has so far proved the best for joining this bronze, although it can also be satisfactorily fabricated by the metal-arc, inert-gas, submerged-arc and inert-gas consumable-electrode welding methods. Products for which the material is used have included screw conveyors, centrifugal pumps, pump housings and heat exchangers.

The paper by M. A. Miller and G. W. Oyler, both of Aluminum Research Laboratories, discussed pressure welding of aluminum. Pressure welding was defined as "the formation of solid-phase weld between metallic materials by the application of a deforming pressure at any temperature below the melting point of the components." Tests have demonstrated that satisfactory pressure welds in aluminum can be made at temperatures below zero, at room temperature and at temperatures up to 1,000 F. At temperatures ranging under 500 F, the extent of deformation during welding determines the weld efficiency. At more elevated temperatures, diffusion is also an important factor in the establishment of metallurgical bonds.

Tuesday Morning

Tuesday morning was limited to two sessions because of the inspection trip to the plants of the Ford Motor Co., scheduled for the same period. At the first of two ship structure sessions, Rear Admiral K. K. Cowart, U. S. Coast Guard, opened the proceedings by relating the history of investigation into the problem of weld-

W. L. ROBERTS, of Westinghouse, receiving the top $750 award from H. V. Beronius, Jr., president, RWMA

W. H. BRUCKNER, University of Illinois, received the 1951 Lincoln Gold Medal from Clarence E. Jackson

ed ships. Studies of tests for evaluating welded ship steels were described by P. J. Rieppel, who conducted this research with C. B. Voldrich, both of Battelle Memorial Institute. The two investigators used so-called "Kinsel" specimens with E-6010 electrodes at room temperature. They found that tiny cracks tended to start in weld metal at low bend angles. Better weld-filler metals, they concluded, would remedy the situation (see description of the Somers-von Blohn paper, page 20, this issue).

At the session on fundamental studies of arc welding, Monday afternoon, an instructive paper was read by Norman G. Schreiner, Linde Air Products Co., on the use of three-phase power in submerged-arc welding. Two electrodes were employed in tandem, spaced at distances of from ½ to 1½ in. apart, depending on plate thickness. Connections were made to the leading rod, the trailing rod and the ground in delta circuits. A high-speed film made at the rate of 6,000 frames per second showed the effects of the arc. Mr. Schreiner and his co-author E. A. Clapp, of Union Carbide and Carbon Research Labs., Inc., are to be congratulated on this excellent piece of research.

How to produce crack-free submerged-arc welds in hardenable steels by controlling preheat and interpass temperatures was told by Arthur F. Shrubsall. Shrubsall and his co-author Clarence E. Jackson are both with Union Carbide and Carbon Research Labs.

Tuesday Afternoon

A well attended session on hard-facing and flame-hardening was held Tuesday afternoon and nearly filled the hotel's grand ballroom. La Motte Grover, Air Reduction Sales Co., gave a very good paper on the use of flame-hardening to minimize wear and batter at adjoining ends of railroad rails. Treated rails show a great deal longer life and other benefits as compared with untreated. Proposed ARRA recommendations call for the heating to extend to ¼ in. below the surface and for an air quench—supplied by introducing compressed air into a quench box around the joint at a pressure of 40 to 50 psi.

The paper that drew the most comment was probably the one delivered by Howard S. Avery, of American Brake Shoe Co. This is one of a series of papers by which Mr. Avery hopes to be able to put hard-facing on a sound engineering basis. In discussing hard-facing for impact, he made the point that hardness is not necessarily synonymous with brittleness. Mr. Avery classified impact as light, medium and heavy, and he named the hard-facing materials appropriate to each classification. For light impact, defined as loading that does not cause stress exceeding the yield strength of the material, he recommended martensitic irons; for medium impact martensitic steels are best; and for heavy impact austenitic manganese steels. Mr. Avery described medium impact as the "range of loading where the material will flow" and admitted that it is difficult to draw the line between medium and heavy impact.

Another very good paper was given by Lieutenant Commander Harrison S. Sayre, of the U. S. Naval Engineering Experiment Station. Commander Sayre described a technique for providing overlay coatings by first metallizing the surface to a controlled thickness and then fusing the metallized coating with an oxyacetylene torch. The flame is directed at the metallized surface until it assumes a glassy appearance. It is helpful to preheat the entire surface to about 600-700 F, and it is often necessary to slow cool to avoid cracking.

The Navy has successfully employed this technique to coat steel propeller blades and steel propeller shafts with crack-free alloys capable of resisting salt-water corrosion. A nickel - chrome - boron alloy (about 75% nickel) was found to have the desired qualities of resisting cavitation and corrosion, but it was apt to crack in cooling and the defects could not be remedied by local heating and remelting. A modified form of this alloy, with silicon added, allowed local repairs and also enabled the coating to cool in air without the formation of cracks.

The "fused metallizing" technique has also been used in industrial applications with marked success. According to one report, a certain tool-steel mandrel was able to perform only 75 operations; after it had been given a fused metallized coating of chrome-nickel-boron alloy the number of operations that could be performed with the same mandrel rose to 35,000.

The third (and last) of the resistance-welding sessions was also held on Tuesday afternoon. Stuart C. Rockafellow, of Robotron Corp., Detroit, discussed the general trends in electronic non-synchronous welding controls. The maintenance man, he concluded, is becoming more interested in electronics. To meet the demand for more information and to counter-

CASIN W. OBERT, winner of Miller Medal, with his daughter, Mrs. Mary Freeman, and his two grandchildren

HERMAN H. WEHNER accepts the bronze plaque from Henry C. Neitzel on behalf of Houston section of AWS

act the complexity of the newer control units, the control manufacturers should prepare better instruction manuals and offer free schooling for the maintenance man. Many control manufacturers are already offering these services.

At the same session, J. H. Cooper, of The Taylor-Winfield Corp., discussed the flash welding of components for aircraft, and Dr. Hiroshi Kihara the fatigue strength of spot-welded joints in light alloys. Dr. Kihara, who is chief of the welding department, Transportation Research Institute, Tokyo, traveled all the way across the Pacific Ocean to deliver his paper. He also gave his audience some interesting information on the activities of the Japan Welding Society, of which he is president. The Japan Society has 1,577 members.

Said Dr. Kihara: "We are in urgent need of technical information, and I wish to express my hearty appreciation of the support given by the American Welding Society."

Wednesday Morning

It is to be regretted that we will have space to skim over only a few more of the many good papers presented during the remaining three days of the convention. At the Wednesday morning session on production welding, L. J. Berkeley, of Berkeley Equipment Co., had some interesting ideas on the design of fixtures for use with the submerged-arc welding head. One idea was that the newest submerged-arc fixtures are actually a new type of machine tool—call them "machine fixtures."

The single session on gas cutting was also held Wednesday morning. A. H. Yoch, of Air Reduction Sales Co., revealed that the industry is now able to sever up to 72 in. of steel and has fully solved the problem of flame-cutting alloy steels. Among his slides, he showed a picture of a locomotive frame 36 ft long being cut in one piece. The template for the electronic tracer took a day to prepare, whereas a steel-strip template would have taken well over a month to construct. Another slide illustrated a cutting machine that can go up and down hill or around curves like a roller coaster.

L. P. Elly, of Bethlehem Steel Co., showed a movie of a mechanized heavy-duty torch set-up that has completely done away with the blasting operations formerly required to break up bulky skulls, butts, etc. The sections cut vary in thickness from 30 to 60 in., with a large volume of work at 45 in. Where the scale is particularly thick, cutting is started by introducing a small amount of molten steel in the path of the cut. In six months' operation, this machine paid for the $25,000 cost of installation.

R. S. Babcock, development engineer of Linde Air Products, discussed a new technique called "flame-washing" to remove fins, pads, adhering sand, chill nails, etc. from castings. A hand torch with a gouging tip is used with an air-borne stream of iron powder. Some foundries have found that the process has reduced cleaning costs by as much as 50%.

Wednesday Afternoon

The mechanical engineering department of the University of Washington seems to be making a name for itself in unconventional welding researches. Last year Professor Gilbert S. Schaller introduced the rotating electrode, and this year, at the Wednesday afternoon session on brazing and cutting, William A. Snyder, assistant professor of mechanical engineering, told of things that happen when welds are made with "nested" electrodes. Such an electrode is formed of two or more core wires bound together with nothing more complex than scotch tape; the electrodes are insulated from each other except where they are gripped by the electrode holder. Nesting patterns investigated included two, three and four electrodes in line with the direction of travel; two, three and four electrodes transverse to the direction of travel; and various combinations of these two basic arrangements such as two electrodes in line and two transverse. Anywhere from two to six electrodes were banded together in the twelve patterns shown in one of Professor Snyder's slides.

Suggested advantages are: different core materials may be combined; high amperage may be used; shape of the molten puddle may be controlled; small welds at high speeds may be made by using the in-line arrangements; wide beads without weaving by employing the transverse patterns. Lack of penetration, however, is a defect to watch for.

Joseph F. Quaas presented a paper written in collaboration with R. D. Wasserman, both of Eutectic Welding Alloys Corp., to explain dilution aspects of brazing in terms of the Hume-Rothery law concerning differences in atomic radii size and to resolve diffusion phenomena in terms of the first and second laws of Fick and the Langmuir-Dushman equation.

Their method, contend the authors of this paper, is a much more scientific approach toward the development of formulas for brazing and soldering filler metals than the old empirical methods. Maybe so, but the math is difficult.

Thursday Morning

A good paper on the selection and training of welding operators for the defense program was given at the Thursday morning educational session by A. N. Kugler, of Air Reduction Sales Co. Kugler thinks that the "related theory" idea is important. All weldors passing their coupon tests must also have had theoretical training. It's no good letting dexterous operators skip this angle.

Thursday also saw the first of two meaty sessions on inert-arc welding. In the four papers presented at the opening session, the emphasis in general seemed to be upon the metal-arc aspect of the process. Paul Klain, of Dow Chemical Co., told how the metal-arc process was applied to the welding of magnesium alloy FS1. The tests were carried out on ¼-in. FS1-H24, ½-in. FS1-F and 1-in. FS1-F plate. The welding wire was 1/16-in. and 3/32-in. J1 (extruded) magnesium alloy. Both helium and argon shielding gases were employed. For most values of machine setting in amperes, arc current in amperes or arc power in kw, the argon-shielded arc showed a considerably higher deposition rate than the helium.

Bernard Gross, who presented a paper written by him and R. A. Smith, both of the Rohr Aircraft Corp., had some interesting speed comparisons. Four welding processes were tested on 0.040-in. stainless steel sheet for standing edge, butt and lap joints. The various speeds were: gas torch 2 ipm; inert-arc, manual, 4 ipm; inert-arc, machine, tungsten electrode, 15 ipm; inert-arc, machine, consumable electrode, 200 ipm.

R. T. Breymeier, Union Carbide and Carbon Research Labs., Inc., took up the problem of metal transfer in an atmosphere of "Sigma" argon; *i.e.*, argon with oxygen added. A high-speed movie showed the improved characteristics of metal transfer when using straight polarity with Sigma argon. The addition of oxygen to helium had no effect on the drop transfer rate.

Using twin parabolic mirrors, a flashing light source and a razor blade, W. B. Moen and G. J. Gibson, Air Reduction Sales Co., succeeded in photographing the normally invisible envelope of inert gas surrounding the welding arc. The method (Schlieren analysis) was applied to a comparative study of helium and argon as arc shields with non-consumable electrodes. The results indicate that either gas will provide adequate coverage, so the choice of gas can be safely left up to the electrical characteristics desired and the economies that may be effected. This was a very neat piece of research and deserves high marks.

Friday Morning

On Friday morning, the inert-arc welding discussion continued, with four more papers. Procedures for welding stainless, stainless-clad steel, low-alloy steel and copper-alloy pressure vessels by the metal-arc welding process were covered by Stephen A. Yaczko, formerly employed by the M. W. Kellogg Co. but now with United Engineers & Constructors, Inc., Philadelphia.

H. T. Herbst, Linde Air Products Co., described a research conducted with T. McElrath, Jr., to weld carbon steels by the inert-arc metal-arc method. The advantages he cited were increased welding speeds and the avoidance of flux contamination. The addition of 5% oxygen to the argon shielding gas was said to increase the droplet rate and also to have a beneficial effect on the weld puddle. The addition of oxygen in this small, controlled amount was not found to cause any oxidation effect. There would seem to be a fertile field for explorations along this line.

W. R. Apblett, who presented a paper written in collaboration with W. S. Pellini, both of the Metallurgy Div., Naval Research Lab., described the results of tests conducted in high-strength aluminum alloys welded with semiautomatic tungsten-arc equipment. Alloys tested were 61S-T, 24S-T, 14S-T and 75S-T. Mr. Apblett's conclusion was that many of the heat-treatable aluminum alloys are not suited to fusion welding, no matter what the process may be.

Glenn J. Gibson and Rudolph O. Seitz, both of Air Reduction Sales Co., contributed the final paper of the session, on thoriated tungsten electrodes. The type Gibson described was the tungsten electrode to which 1% thoria (thorium oxide) has been added. Electrodes with 2% thoria and 15% thoria were also tested, but the higher thoria content did not seem to make much difference in welding conditions. The addition of thoria was found to reduce the consumption of the electrode markedly—electrodes would last five times as long or even longer than the pure-tungsten type. Other advantages cited are: better arc starting, less loss of welding time in electrode changing, less danger of contaminating weld metal.

Very beautiful colored slides were exhibited to show how a solid *point* at the end of a thoriated electrode in the welding arc compares with a molten *ball* at the end of a plain-tungsten electrode. Other slides, though having nothing to do with thoriated tungsten, were interesting in that they showed how arcs look in an atmosphere of the rarer inert gases, neon and krypton.

Metallizing Symposium

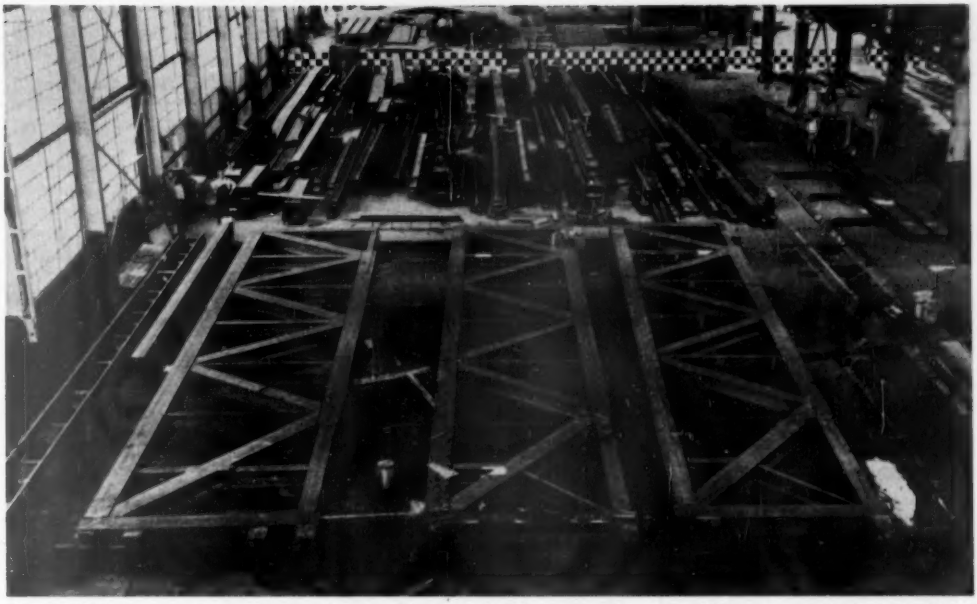
Also on the Friday morning program was a symposium on metallizing, sponsored by the AWS Committee on Metallizing. Simon A. Greenberg, technical secretary of the American Welding Society, served as chairman.

Three papers were given. That by Fred J. Keller, Aluminum Co. of America Research Laboratories, included a brief history of the metallizing process, a presentation of its principles of operation, and a brief summary of the range for application.

Sam Tour, of Sam Tour and Co., Inc., discussed the more recent developments in metallizing equipment and accessories, methods of surface preparation, and the characteristics of metallized coatings including mechanical properties, wear resistance, corrosion resistance, etc.

Knowles B. Smith, Dix Engineering Co., Inc., described typical metallizing applications in various industries and size ranges. Exhibits of actual metallized specimens and applied products were on view before and after this stimulating session.

To sum it all up, it was a grand convention. We're glad we were there!



1—THREE one-story 16-ton trusses for the laboratory building were shop assembled on carefully leveled skids

Saved Steel, Cut Costs

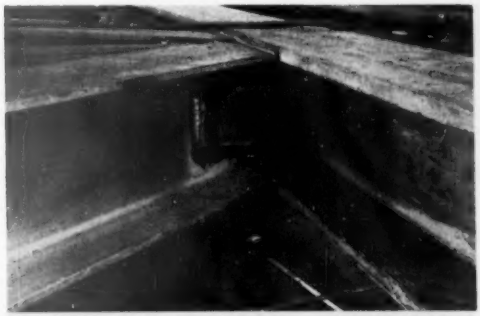
If you're looking for arguments to show why welded construction should be used for buildings, examine the $7,000,000 Mt. Sinai Hospital addition project.

BY LaMOTTE GROVER

Welding Engineer, Air Reduction Sales Co.

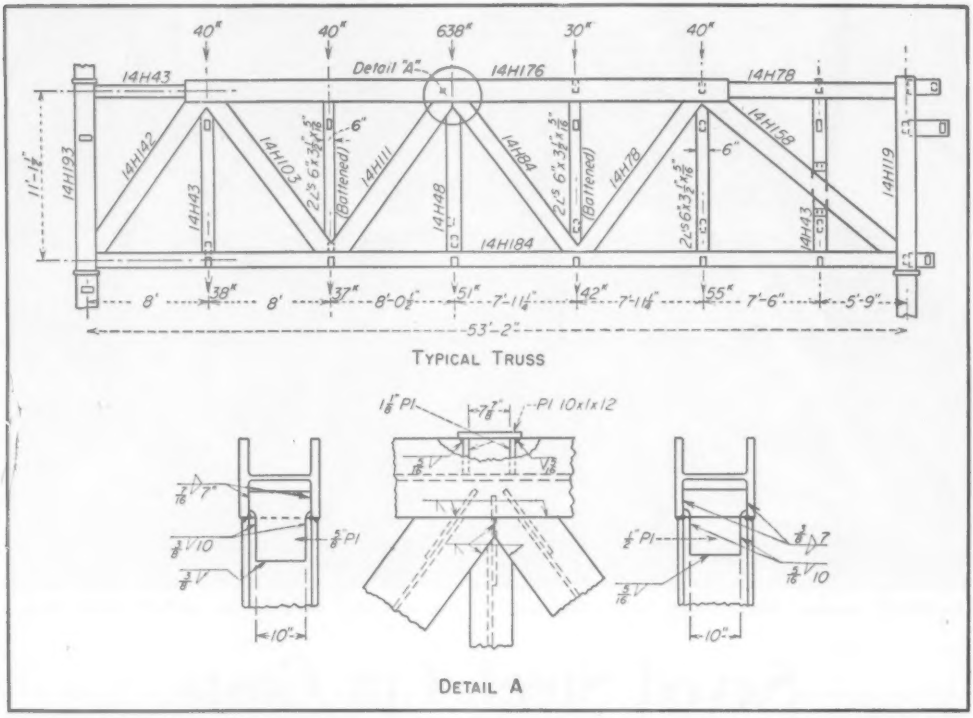
WELDING is most important to the construction of a large addition to the Mt. Sinai Hospital, New York City. The contract for the three new buildings, which involved some 2,700 tons of structural steel, is believed to be the largest contract ever awarded in New York City for all-welded building construction. A recent modernization of the provision for welding in the city's building code was reflected almost immediately in a more efficient design for three heavy trusses of one-story height.

The saving in material for these trusses was comparatively large—approximately 30%—because of rather unusual arrangement and conditions of loading. Each truss of welded design required 15.7 tons of steel, as compared with 22.3 tons for a truss of riveted design. The weight of connection material and other details included in the total weights was only



2—CONNECTION plates were used to develop webs of the diagonals and the web of one of the heavier verticals

3—HOW DIAGONAL and vertical members were joined to the top chord of the truss. (Compare with Fig. 4.)



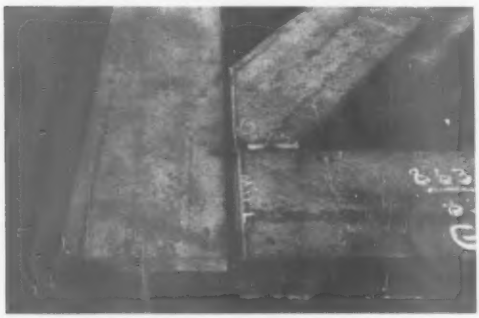
4—ELEVATION of a typical truss and some of the details. Compare detail A with photo of top chord (Fig. 3)

5—ENDS of H-beams were flame-beveled before fit-up and welding

3.6% of the weight of the welded truss members, as compared with 32.4% of the weight of the riveted.

A Two-Block Plant

The huge Mt. Sinai hospital plant spreads north over two city blocks from East 98th St. to East 100th St. and extends from Fifth Avenue (where it faces Central Park) eastward to Madison Avenue. The $7,000,000 additions consist of a 150-bed maternity annex of 9-story height, the 8-story Atran general laboratory and the 3-story Berg Institute of Research. The L-shaped maternity building fronts on Fifth Avenue with one wing on 99th St., the Berg Institute is immediately behind it on 99th St., and the Atran laboratory is at the corner of Madison Avenue and 99th St. The three heavy trusses previously mentioned are encased in the walls of the main laboratory building.



6—TRUSS joint that has been fitted and tack welded

7—JOINT after finish welding. Compare with Fig. 6

To understand just what the new provisions in the New York City Building Code mean to welded construction, it is necessary to go back some 13 years ago when the original provisions relating to welding were adopted. At that time butt welds had not been accorded the full allowable base-metal stresses. Splices and gusset-plate connections made by fillet welding had to be added to develop the full allowable static strength of the base metal.

Guided by research and experience, the American Welding Society and the American Institute of Steel Construction several years ago adopted provisions in their recommended building codes that assigned to butt welds the full allowable working stresses of the base metal. It was these stress provisions that the New York City code adopted. This recognition of facts established by research has made it possible to design welded trusses and girders of less weight and greatly improved efficiency.

8—CRANE holds truss in vertical position for welds on web connections

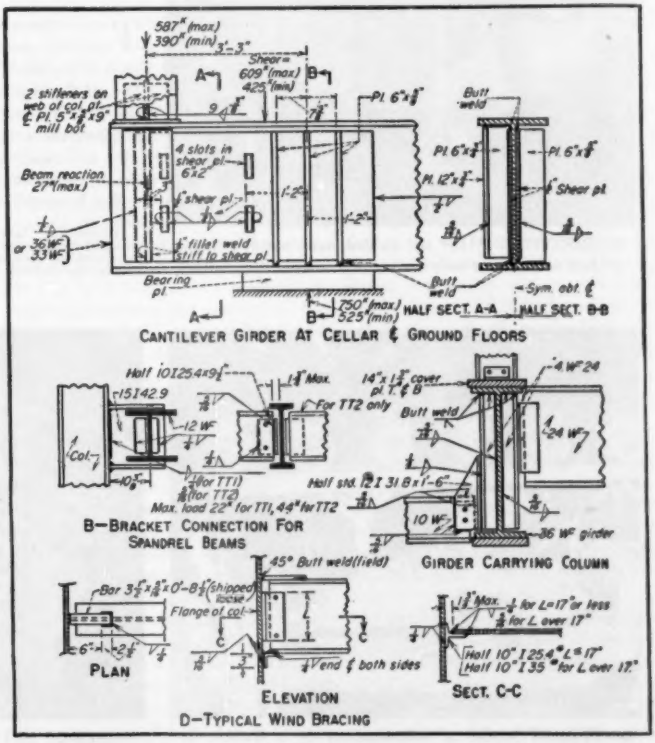
Details of Welded Design

The story-high trusses were shop assembled by butt welding H-beams. These three trusses are almost identical (Fig. 1). Spanning 54 ft over a basement delivery area, they support two floors directly. In addition, at midspan, each truss supports an exterior column that carries seven upper floors. These floors cover only half the length of the trusses because of an offset in the upper stories to afford daylighting on the side of the addition that is adjacent to another building.

Because of the comparatively short span of these trusses and the heavy loads to be carried (a total of nine floors), very high shear loads must be carried by the diagonal members. A riveted design would have required a complicated multiplane system to accommodate the number of rivets needed at the joints. This would have increased both fabricating costs and the weight of the steel. The welded trusses might have been replaced by welded plate girders, but these were not considered because of the necessity to provide openings for doorways in the walls that encase the trusses.

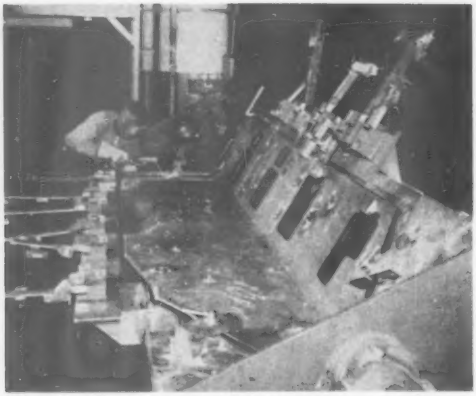
All truss members are 14-in wide-flange sections, joined by butt welding. To facilitate welding, the sections were shop assembled so that the flanges would lie in vertical planes when the truss was in upright position. Connection plates (Fig. 2) were used to develop the web areas of the diagonal members and the web of one of the heavier verticals. Each of

(Continued on page 42)

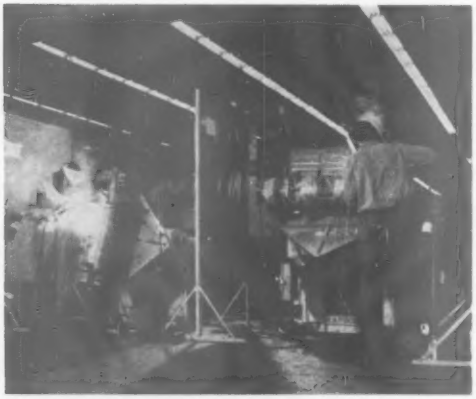


9—NOTEWORTHY details of welded connections in the structural frame

1—HULL section of the new T41-E1 is a fabricated structure made from rolled, formed armor sections



2—HOW TYPICAL plate assembly is held in a fixture while various small components are welded to it



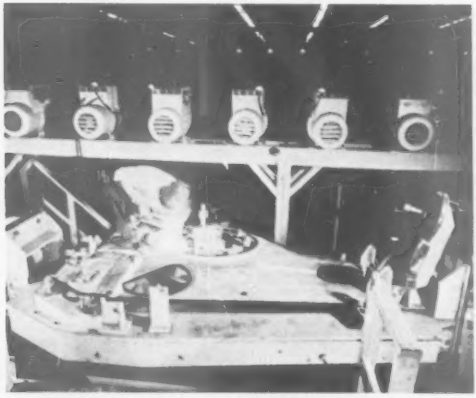
5—MOUNTING PADS are welded onto outer cylinder of gun mount assembly in another positioning fixture

Making "Bulldogs" at Cadillac*

THE TREND to all-welded homogeneous armor continues in the newest improved military tank, now being built in the new Cleveland Tank Plant, Cadillac Motor Car Div. of General Motors Corp. The most modern light tank, the T41-E1 (otherwise known as the Walker "Bulldog"), employs the principle of die-formed armor. By changing over to formed homogeneous armor or to forgings, more than 4,000 lb of castings per vehicle have been eliminated.

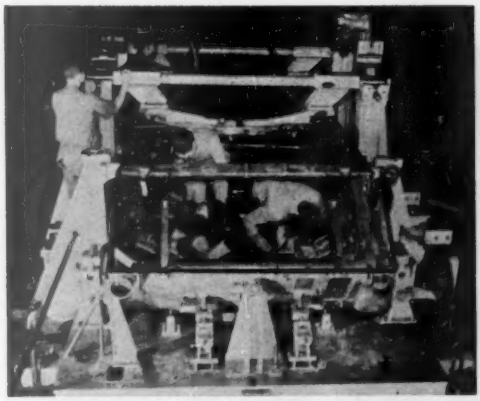
The formed homogeneous armor also supplies extra rig-

*Information taken from a paper written by Edward N. Cole, plant manager, and Harold G. Warner, assistant general superintendent of Cadillac's Cleveland Tank Plant, for presentation before the Detroit Section, SAE, on Oct. 22, 1951.

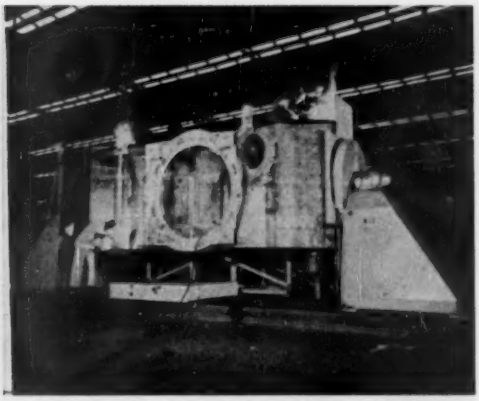


6—TURRET ROOF is subassembled in a fixture. It will later go to the master set-up buck in Figure 7

7—SET-UP BUCK in which the various subassemblies for turret roof are joined into a unified structure



3—MASTER set-up buck, where the major plates and subassemblies are positioned and root passes are made



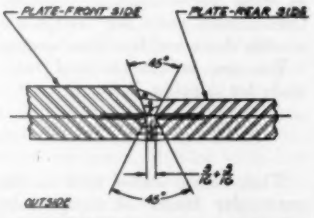
4—POSITIONING fixture allows the entire hull to be rotated to make each weld in a favorable position

idity to the structure. This may seem relatively unimportant on a heavy mass like a tank; however, the hull is susceptible to a certain amount of internal stress from welding and armor forming, which must be controlled.

The hull section (Fig. 1) is a fabricated structure made from rolled, formed homogeneous plate and cast armor. The hull plates are delivered in the formed condition, with many of the machining operations such as drilled-and-tapped holes, scarfing, etc., already completed.

A precise welding procedure is established for each weldment, covering such information as the number of passes, the size of the rod, the type of rod, the amperage, voltage, polarity and current, the sequence of the welding passes and any other information that is required to make a ballistically sound weldment. The accompanying sketch (Fig. 8) details the procedure for a typical plate joint in the flat position.

Figure 2 shows how a typical plate assembly is held in a fixture for the attachment of various small components. The plate then goes to a master set-up buck (Fig. 3), where all the major plates and subassemblies are accurately positioned. At this stage, the root pass is made in each joint. The assembly is then ready to be moved to a positioning fixture (Fig. 4), which allows the hull to be rotated. All overhead and vertical-up welding is avoided by positioning.



8—WELDING sequence and details of edge preparation for a double-vee butt weld in rolled armorplate

The gun mount is another rather unusual assembly made at the tank plant. The outer cylinder of the gun mount assembly is made from a seamless tube, with various mounting pads welded in place and then machined for accuracy. You can see the welding of these attachments to the tube in Fig. 5; it is done in a positioning fixture, permitting the operator to rotate the work for most favorable welding. After the gun mount has been assembled it is "gymnasticated" in a special fixture, where it is cycled several times to check for leaks and buffer action. The completed assembly is then shipped to the Erie Ordnance Depot for proof firing.

The turret assembly is processed in a similar manner to the hull, with all weldments completely "procedurized" to control ballistic properties and to control stresses imparted to the structure from the weldment. First, the turret roof is subassembled in a fixture (Fig. 6), which holds it while some of the heavier welds are made.

The turret roof and other assemblies are joined in a master set-up buck (Fig. 7) to make a unified structure. This buck is only used for tacking purposes and to make the root pass between some of the plates. The turret assembly is then taken to a positioning fixture, which places the weldment in the most advantageous position for the operator. After the turret assembly has been completely welded and approved, it is moved to the machining area.

The former Air Force plant in Cleveland was selected as the production location. This plant has main aisles that are wide enough to accommodate highway trucks with trailers. Inasmuch as considerable welding was planned to be done, the ventilation system had to be expanded to change the air frequently in order to dissipate the welding fumes. The enlarged ventilating system will now handle over 1,000,000 cfm of air.

Initially, only 55 people from the Cadillac Detroit plant were assigned to the Cleveland operation. Today, there are 6,500 employees, including more than 500 engineers and supporting personnel. A 24-hour-day welding school has trained over 600 welders for production operations. Before an arc weldor is allowed to weld armor for tank production, he must be qualified by an Ordnance Corps inspector and samples of his work X-rayed.

Plant personnel had looked like an item in scarce supply, but on the first day the plant opened for employment some 8,000 people lined up to make application. To date, over 100,000 applications for employment have been turned in.

Spray tank for farm tractors . . .

1—STRAIGHT-LINE welding of longitudinal seam of a spray tank

2—CIRCULAR welding joins the two ends to the cylindrical shell

3—ALUMINUM spray tank is now completed and ready for shipment

"Tanks-a-Million"

Four inert-arc welding processes, manual and automatic, should help the Beeson Tank Co. to live up to the above slogan in the production of aluminum tanks.

BY CLYDE SMITH

Superintendent, Beeson Tank Co.

FOUR variations of inert-arc welding are used by the Beeson Tank Co., Chillicothe, Ill., to fabricate aluminum tanks. These variations are: (1) manual welding with filler rod added, (2) straight-line automatic welding, (3) circular automatic welding and (4) welding in which a consumable aluminum electrode is automatically fed into the weld area under a blanket of argon gas.

Beeson's small, neat plant is located practically in farm land. Five of the plant's dozen employees are welders. Besides welding equipment, the plant contains a shop-made head flanger, a shear for cutting circular heads, a square shear, medium-duty forming rolls and a press brake.

The company's main products are aluminum spray tanks for farm tractors, sump tanks for stationary Diesel engines, syrup tanks for canning factories and ornamental hand rails assembled from extruded aluminum shapes.

The aluminum spray tanks (Figs. 1, 2 and 3) are almost 100% automatically welded by inert gas-shielded arc welding. These cylindrical tanks are made in two sizes: 160-gal and 220-gal. The smaller tank is 36 in. in diameter and 36 in. long; the larger has the same diameter but is 48 in. long. The material is 3S-H-14 aluminum sheet 0.081 in. thick. There are 274 in. of automatic welding on the 160-gal tanks and 290 in. on the 220-gal size.

The sheet for the tank body shell is sheared to size and formed. The edges to be welded are upset about 1/16 in. in a direction away from the tank center. Edges to be welded are clamped in the jig shown in Fig. 1, in which the longitudinal weld is made. This straight butt weld is made at a speed of 20 ipm, with an a-c, high-frequency welder. Current is 150 amp; argon flow 7½ liters per minute; electrode a ⅛-in. tungsten. No filler rod is added. The electrode holder is mounted on a flame-cutting machine which moves the arc to make the weld. The same set-up is used to join smaller pieces of aluminum sheet into tank ends.

Beeson has devised a clever method to weld the ends to the tank body. Figure 2 shows this weld in progress. The same machine-mounted welding head is run on a circular disc without tracks. The disc is welded to the bottom of a tubular column that is adjustable up and down in a sleeve fixed to the wall. The vertical adjustment enables tanks of different lengths to be accommodated. The machine carriage holding the arc torch is fixed to the center column by a radius rod so that the machine motion is held to a perfect circle.

During welding, the tank rests on the floor and is held against two adjustable stops, spaced about 2 ft apart. These stops are behind the tank and are not visible in the picture (Fig. 2). A steel wire and spring hold the tank against the stops. Tank ends are welded to the tank body by simultaneous melting of the aluminum of the body and end. The weld is a modified fillet without filler metal. Speed is about 20 ipm, and the settings for current and argon flow are the same as those for straight-line welding. Our finished welds are remarkably smooth, dense and free from spatter.

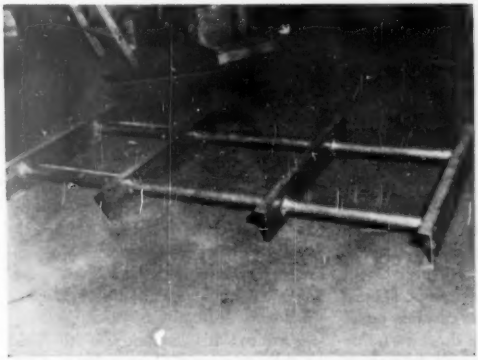
You can see the finished tank, ready for shipping, in Fig. 3.

SUMP TANK FABRICATION

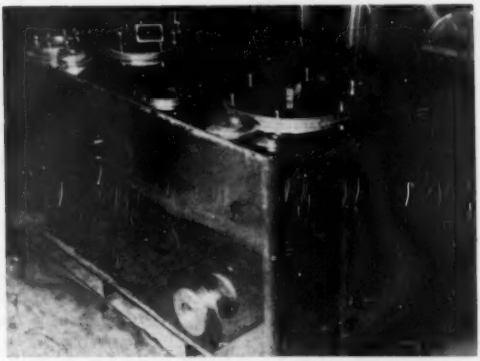
When Beeson started work on the rectangular Diesel oil sump tanks (pictures 4, 5, 6 and 7), they found an excellent application for "sigma" welding. ("Sigma" is a trade name

4—INERT-ARC metal-arc process: weldor is adding a stiffener inside the half body of a Diesel sump tank

5—CONTINUOUS fillet welds by same process join the bottom of the sump tank to the four tank sides



6—TANK BASE is a subassembly made by inert-arc welding heavy aluminum channels to aluminum piping



7—NEARLY COMPLETED sump tank. The flanges and other fittings were added by manual inert-arc welding

that stands for shielded-inert-gas-metal-arc.)

The 650-gal sump tanks are 80 in. long, 48 in. high and 40 in. wide. Tank sides, top and ends are made of ¼-in. 3-SF aluminum plate. The same material and process is also used for inside dividers, stiffeners and filter shelf. There are about 120 ft of welding per tank, and only two man-hours of welding time are needed.

In Fig. 4, the weldor is joining a stiffener to the inside of a tank half body. The stiffener is clamped to a steel frame positioner, while an intermittent series of fillet welds are made between stiffener and body. The welding is done with d-c reverse polarity, 200 amp, using a 3/32-in. aluminum rod and argon flow at 7 liters per minute. After the stiffeners are welded in, the two half bodies (which make up the four sides) are set up and tack welded in the vertical joints at each end. To make these two welds, the tank is positioned on the end for downhand welding.

Tank bottom and top are tack welded to the body from the inside. The operator in Fig. 5 is laying a continuous fillet weld between tank bottom and tank side. Practically the same procedure is used to weld the tank top to the sides.

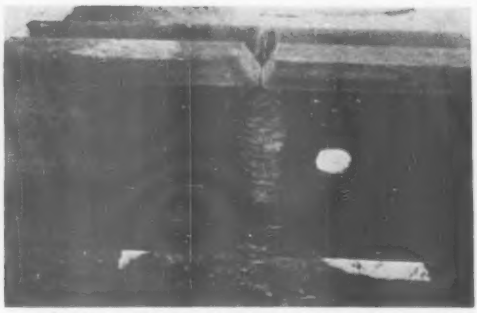
The tank base, Fig. 6, is a subassembly of heavy aluminum channels welded to aluminum pipe. Again, the inert-arc metal-arc process is used to assemble the pipe and channels and to weld the base to the tank bottom.

An almost completed sump tank may be seen in Fig. 7. The reinforcing flanges, fillet welded around openings in the sides and top, are of heavy aluminum plate. The openings, by the way, were cut in the ¼-in.-thick tank top and sides by an air-driven aluminum hand saw. The flanges and other fittings were joined to the tank body by manual inert-arc welding.

The inert-arc welding methods, both manual and automatic, have worked out admirably in this aluminum fabricating plant. Welding is done quickly and with minimum rod consumption. Weld quality is excellent, and extremely few leaks show up. Grinding has been kept to a minimum as spatter is negligible and there are no flux-cleaning problems.

These welding methods should help us to live up to our slogan of: "Tanks-a-million."

1—STEEL STRIP is clamped to ends of 128-lb rails to hold alignment while the rails are welded together



2—AFTER WELDING heel and web, strip is knocked off rail to allow the ball to be welded. Note bevel

Rail Welding and

If there's anything you'd like to know about welds for railroad track maintenance, ask Jake Ufholtz. He has built up a business to do just such specialized work.

BY FRED M. BURT

J. J. Ufholtz (better known as "Jake") has developed a highly specialized track maintenance service for the Los Angeles Junction Railway. Ufholtz, who runs the Southeast Custom Welding Co., of Los Angeles, is a top-flight weldor who has been doing a lot of the specialized welding described in this article over the past four years.

JAKE UFHOLTZ (left) and his son Norman ready to take off in jeep

Jake, who has the instincts of a research scientist, recognized that all of the different railway trackage components—rails, switches, frogs, crossings, etc., etc.—present specialized problems under varying conditions of usage. To get down to fundamentals, he took several courses in welding metallurgy at the University of Southern California and at the University of California, Los Angeles. In his shop, he also made hundreds of test welds pertinent to track problems, testing out a wide variety of electrodes and working out new techniques of application.

Tracks Kept Busy

The Los Angeles Junction Railway, for which Jake's firm works as contract weldor, is one of those indispensable city railroads that remain practically unknown to the general public. It operates 64 miles of track and three switch yards with a capacity of 1,070 cars, all located in the 2,800-acre central manufacturing district of L. A. More than 400 manufacturers in this area are served by the L. A. J. Ry., which enjoys the privilege of shipping or receiving without penalty over the Santa Fe, Union Pacific, Southern Pacific and Pacific Electric railroads.

As the Junction Railway operates a 24-hour day and 7-day week, its tracks don't get much rest. The constant pounding of heavy locomotives and heavily loaded cars was causing a lot of expense in rail replacements for street crossings. Ufholtz thought that much of this expense was unnecessary and sold the railway management on his methods for keeping it down.

One of his methods is to weld 128-lb crossing rails together and attach them to 90-lb siding rails on each side of the crossing. Figure 1 shows two rail ends of guarded 128-lb rail with a steel strip clamped on and tack welded to hold the alignment while the rails are being welded together. After welding, the strip is knocked off and the joint is surface ground. Figure 2 shows the web partially arc welded with E CuA1-A electrodes. The bevel in the ball will be filled with a steel that will work harden to about the same hardness as the rails, while the last two or three passes will be made with a hard-facing electrode.

Making "Comp" Joints

To join the dissimilar rails (128-lb to 90-lb), Ufholtz welds up compromise or "comp" joints. Figure 3 shows how such a joint is made to join a 128-lb guarded rail to an 85-lb unguarded rail. In making up these

3—COMP joint that Norman Ufholtz is welding will join a 128-lb guarded rail to an 85-lb unguarded rail

4—JAKE WELDS together 128-lb guarded rail sections to make up 110-ft lengths for a street crossing

Reconditioning

joints, the sections of the different rails are welded together and used as a jig on which to bolt, on each side, the pieces to be welded together. These pieces are 128-lb and 85-lb angles, flame-cut to size.

At the track site, the "comp" joint enables the two dissimilar rails to be bolted together.

Let's look at the particular crossing near Slauson and Eastern avenues, which is important because of its proximity to the Chrysler, Lincoln-Mercury and Consolidated-Western Steel Corp. plants. The three tracks required six 128-lb guarded rails, each 110 ft long. Four rail sections had to be joined (requiring 18 welds) to make up one of the 110-ft lengths. The rails were aligned on cross ties for welding (Fig. 4), and the 110-ft lengths were then worked into position for the crossing. This is a permanent installation that will need no maintenance work for many years.

How Welds Were Made

An exact preparation technique was necessary to do this rail-connecting welding. First, the heel and web of each rail end were torch beveled on each side. The same beveling was done at the top of the ball. The prepared ends were then spaced 1/8 in. apart and raised 1/8 in. above the horizontal plane to allow full contraction; at the same time the adjoining rails were placed in perfect alignment. A steel strip was clamped on the adjoining rail tops (on the ball of the rail) and tack welded. This enabled the alignment to be maintained during the welding.

On the heel, 1/4-in. E Cu A1-A electrodes were used to fill in the joint. Successive passes were made on alternate sides of the heel. The web was welded in one vertically deposited pass per side using 3/16-in. electrodes. To hold stress to a minimum, welding was alternated from one side to the other after every fourth electrode had been deposited.

With this technique, the rails can be partially welded, allowed to cool, and welding continued at a later time without causing excessive stresses. On busy crossings, it is necessary to allow for such interruptions to the work.

Joint Advantages

The advantages gained through the use of welded joints are:

No more loose rail joints.

No more connecting plates, bolts, washers or nuts to become loosened.

No more jumper cable connections across the joint for signal control.

No more broken pavement sections to get at the rails for repair or replacement.

No more expensive repairing jobs on crossings that stay in perfect alignment. Hundreds of these crossing joints have been made up and installed, some more than four years

5—TO MAKE a guarded rail, the 75-lb section is welded to 110-lb rail in position shown at the left

6—UNGUARDED 110-lb rail (left) is welded to 128-lb guarded rail

7—DAMAGED wing rail in open-hearth steel frog. The battered portion of the rail has been gouged out with a cutting torch for build-up (Fig. 8)

8—BUILD-UP is done, and frog has been resurfaced to resist wear

old, and the heavy traffic hasn't caused a single failure.

To Make Guarded Rail

In some instances where new crossings are instituted or black top is to be laid around plain rail, or for some other reason it is found desirable to make guarded rail out of unguarded rail, a lighter rail is welded to the track rail to form the guard. In Fig. 5, Jake Ufholtz has his hand on a section of guarded rail. In front of it is a section of the conventional 110-lb rail used in sidings. To make a guarded rail out of the latter, a section of 75-lb rail is welded in the position shown, using welded-in support blocks below.

Ufholtz often welds dissimilar rails together. In Fig. 6, an unguarded 110-lb spur track rail (left) has been welded to a 128-lb guarded rail for a street crossing. Other jobs that come his way are to recondition battered sections of rail and to build up worn frogs and switch points. When new frogs are joined to old rail, the ends of the latter must be built up to match the frog.

Figure 7 shows a damaged wing rail in a frog of open-hearth steel. The battered portion has been gouged out with a cutting torch in preparation for the repair. In Fig. 8, the damaged portion has been built up, and the balance of the frog has been completely reconditioned with electrodes of work-hardening steel.

In a crossing of the Los Angeles Junction and Union Pacific railways, the ball part of a rail end cracked loose ("X" in Fig. 9). It was reattached by arc welding and presents an appearance as good as new after a year's hard service.

9—BALL PART of rail end "X" cracked loose in a railroad crossing. It was reattached by arc welding at "0" to restore the crossing to service

Switch points and frogs are brought into the Southeast custom welding shop for reconditioning at a minor cost for a major steel saving, of much importance in these days of steel shortages. At this writing, five 90-lb switch points, 15 ft long, are being built up by arc-welding deposits of the proper electrode and finished with hard-facing. Each weighs about 450 lb and has a replacement cost well over $100. Jake's bill is only a fraction of the replacement costs.

The main section of rail generally lasts as long as three reconditionings of the points, and the wear resistance after each build-up is greater (as a rule) than that of the original point.

In addition to a full complement of shop equipment, Ufholtz owns a Willys-Overland jeep that pulls either a four-wheel 300-amp engine-driven d-c welder or a two-wheel, 250-amp welder. When the jeep moves out on field trips, it carries oxygen and acetylene cylinders, welding and cutting torches, and an assortment of all of the types of electrodes required. A rubber-tire-mounted, portable flexible-shaft grinder powered by a 4-hp gasoline engine goes along to take care of any grinding required. Most rail joints require grinding to make them smooth enough for wheel impacts.

Large railroads are equipped to do the welding mentioned herein, and do most of it in one way or another. But even they find it advantageous to use the services of a specialist like Ufholtz, who does his more important work "on location."

1—SUPERALLOY engine parts and liners go into the tail of the above "Sabre," a jet-propelled fighter plane

2—INERT-ARC welding is one of the processes employed to assemble superalloy stampings for jet parts

Welding the Superalloys

Superalloys are costly materials used in jet engines. Welding is currently facilitating their fabrication at the plant of Stainless Steel Products, Inc.

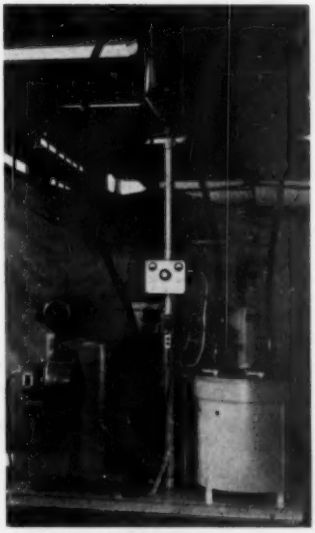
BY JOHN STARR

SUPERALLOYS are various special materials, often non-ferrous, with extreme mechanical strength and corrosion resistance at the high temperatures essential to the efficient operation of jet-propulsion engines. As an example, the superalloy engine parts and liners in the tail of a North American "Sabre" (Fig. 1) enable the jet-propelled fighter to be flown at a speed and efficiency otherwise impossible.

Superalloys are now being manufactured as stock materials with a growing variety of compositions, properties and trade names by such firms as Westinghouse Electric Co., Allegheny Ludlum Steel Corp., Haynes Stellite Co. and General Electric Co. When ferrous, these various products can be classified in general like stainless steels. Table I gives properties of three groups: austenitic, low carbon, medium carbon.

Welded Repair to Dies

Welding methods are currently facilitating the production of superalloy aircraft assemblies at the plant of Stainless Steel Products, Inc., Burbank, Calif. However, the work of fabricating and assembling superalloys involves a number of unprecedented difficulties because the new materials lack the ductility and related fabricational qualities which can be expected in most steels. Moreover, aircraft work is normally based on the use of "Temporary tooling"; *i.e.*, tooling for relatively short production runs. Aircraft tooling must be designed to meet the constant need for



3—SUBMERGED-ARC welding is also employed. The equipment includes a power-driven turntable and also a vacuum flux-recovery system

4—Gravity drophammer does the stamping out of superalloy parts

5—GAS WELDING is called upon to aid in the repair of "Kirksite" dies for stamping. The torch fuses fresh zinc alloy over damaged die surfaces

changes or improvements in the design of parts and assemblies.

In the Stainless Steel Products plant, it has been customary to use dies cast from "Kirksite" (a zinc alloy) for the stamping of superalloy sheet or plate stock. A rope-type gravity drophammer is used to do the stamping (Fig. 4). Often, however, superalloys are too brittle to be fabricated with gravity drophammer equipment at low temperatures and may not attain the desired flow properties until they have been preheated to more than 1,000 F—far above the melting point of the zinc-alloy tooling.

Table I. Comparative Properties of Superalloys

Properties	Alloy Types		
	Group I (Austenitic)	*Group II (Low Carbon)*	*Group III (Medium Carbon)*
Average density, grams per cubic centimeter	8.14 to 8.26	8.20 to 9.24	8.2 to 8.61
Mean coefficient of thermal expansion, in. per in. per deg F X 10^6	7.96 to 9.78	6.66 to 9.77	7.91 to 9.24
Maximum tensile strength, psi, at room temperature	86,800-125,000	81,200-84,200	80,800-113,000
Maximum tensile strength, psi, at 1,500 F	49,400-59,000	40,000-58,500	55,300-65,700
Creep rate, per cent per hour, for 1,000 hr at 1,000 psi			
At 1,200 F	0.000045		0.000042
At 1,500 F	0.000094		0.000066
Maximum hardness, Rockwell	89-90 (B-scale)	34-39 (C-scale)	24-48½ (C-scale)
Stress to rupture, psi, at 1,500 F, 100 hr	13,500-18,000	14,100-54,000	3,000-83,000

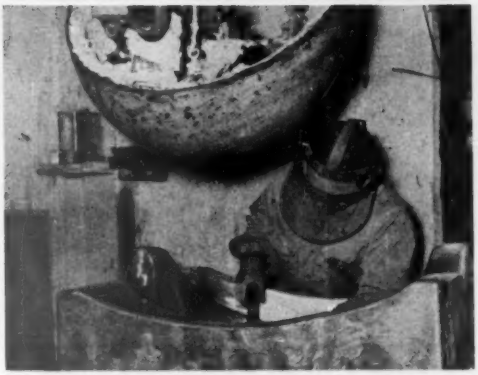
Table II. Temperature Tests of a Nickel-Base Alloy

Specimen Number	*Test Temperature, F*	*Yield Strength, Psi*	*Ultimate Strength, Psi*	*Elongation, % in 2 in.*	*Reduction of Area, %*
1A	Room	62,000	136,500	44.0	41.9
1	572	51,500	124,800	45.0	41.5
2	932	56,650	117,300	33.0	28.6
3	1,292	58,200	87,200	9.5	15.5
4	1,652	.....	52,150	18.0	19.6
5	1,832	.....	26,700	26.0	32.2
6	2,102	.....	9,000	25.0	39.8

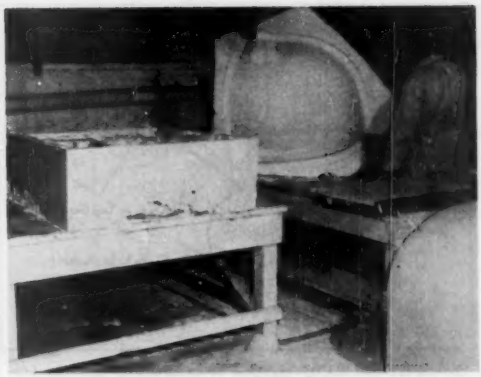
The problem has been solved to a certain extent by shielding the Kirksite dies with heat-resistant lubricants and by using forging tongs to handle preheated stock materials. When tongs are used, the preheated superalloys contact the die surfaces for no more than a few seconds. Even these precautions, however, cannot prevent the dies from being damaged before the completion of the production run. To avoid the need for casting new dies, plant engineers have worked out an ingenious method of using welding equipment to repair cast-Kirksite tooling. It is believed that tooling costs would be double without this method of repair with oxyacetylene welding torches and special bluing blocks.

First, the gas welding torch is used to fuse fresh Kirksite over worn and damaged die surfaces (Fig. 5). Bluing blocks are then used to provide dye impressions to serve as a guide for grinding down the high spots (Fig. 6) until the surfaces are restored to the desired dimensional accuracy. The bluing blocks (Fig. 7) are the same as the plaster patterns used in casting the dies except that they are coated with a transferrable blue substance. When a die is properly aligned and allowed to contact the bluing block, any surface irregularities are delineated as bluish areas on the die surface. The blue spots are the areas where grinding is done.

Riveting and bolting are generally unsatisfactory methods of assembling superalloy stampings. The materials are exceedingly difficult to drill or machine, and the riveted or bolted joints lack the sort of strength that



6—GRINDING weld-repaired die. Metal is ground to accord with marks made by a "bluing block" (overhead)



7—BLUING blocks, fabricated in the pattern shop, look much like original plaster patterns for casting

is required for aircraft structural purposes.

Methods of Welded Assembly

Welded assemblies that have successfully met rigid government specifications have been produced at the Stainless Steel Products organization. Arc-welding equipment, with and without inert-gas accessories (Fig. 2) is preferred in assembling a majority of superalloy stampings. Gas welding, however, has been used with equal success in mating very light-gage materials and in trimming or cutting operations to prepare heavy stampings for assembly by arc welding.

The company's welding equipment includes a pair of 150-amp d-c welders with accessories for the use of inert gases, a 300-amp d-c welder, a high-frequency a-c welder with a water-cooled inert-arc torch and a submerged-arc welder equipped with vacuum flux removal (Fig. 3). There are also two gas-welding rigs and flame-cutting equipment.

Preheat and Annealing

In general, special processing techniques are essential to the successful welding of superalloys in order to avoid carbon pick-up and stresses of the type that might cause cracks or impair the corrosion resistance. With oxyacetylene equipment, the technique usually involves nothing more than the use of a neutral flame and a supplemental heat treatment.

Where heavy-gauge materials or parts with different thicknesses must be assembled, a number of procedural variations may become essential. For example, the thicker parts are preheated in a furnace to a dull-red color prior to welding. Preheating avoids the concentration of too much heat at a single point, which will create excessive stresses in a weld. However, it usually necessitates a full annealing after the parts are welded because the preheat temperatures, if held for an appreciable length of time, can seriously reduce the corrosion resistance of superalloys.

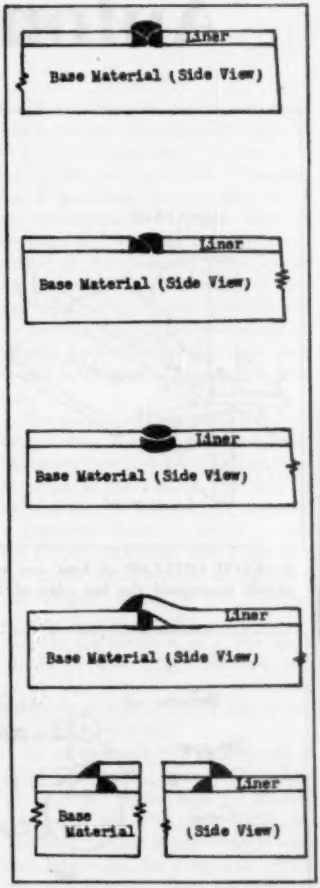
As a rule, the technique for producing a superalloy weld is equivalent to the technique required to weld stainless steel. It has been necessary, however, to devise special types of welds (Fig. 8) for the assembly of superalloys as liners for standard steel. Liners are necessary because most of the superalloys are not yet available as clad-sheet materials.

Avoid overheavy beads in superalloy joints. The excessive heat needed for heavy beads will often lead to hairline fissures.

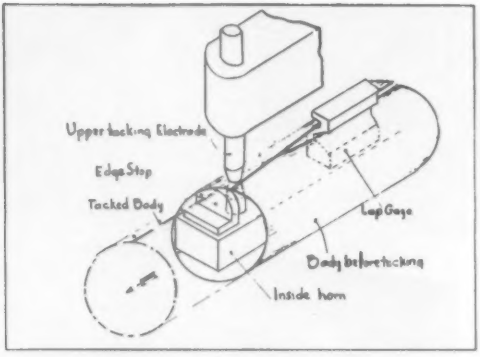
The ductility of superalloys at red-heat temperatures is not usually great, but the preheated parts are subjected to undesirable stresses and distortion if inadequately supported during welding. Table II shows how tensile strength goes down in short-time high-temperature tests of a nickel-base alloy containing 26 to 30% molybdenum, 4 to 7% iron and 0.12% carbon (maximum). Ductility declines also until a temperature of about 1,300 F, when it begins to rise.

Bars used in this test were annealed

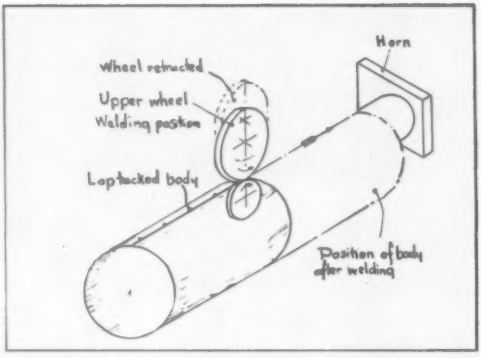
(Continued on page 54)



8—METHODS of welding seams in superalloy liners. The bottom two don't represent the best practice

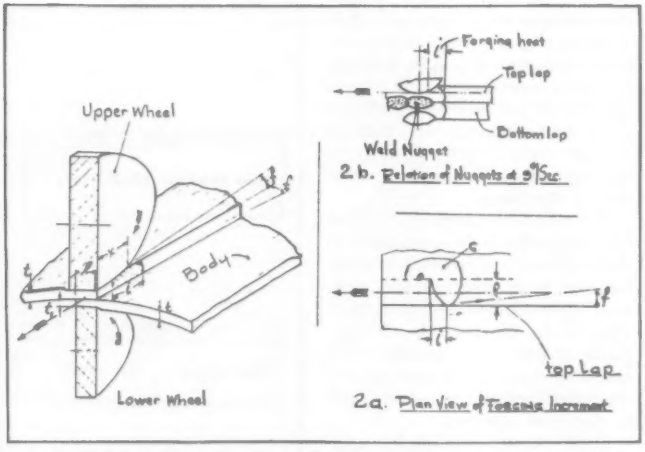


3—SPOT-TACKING method of controlling thermal lap expansion needs both a spot welder and a seam welder



4—AFTER SPOTS are tacked, the shell is moved to seam welder and is placed between the welding wheels

Automatic Equipment to

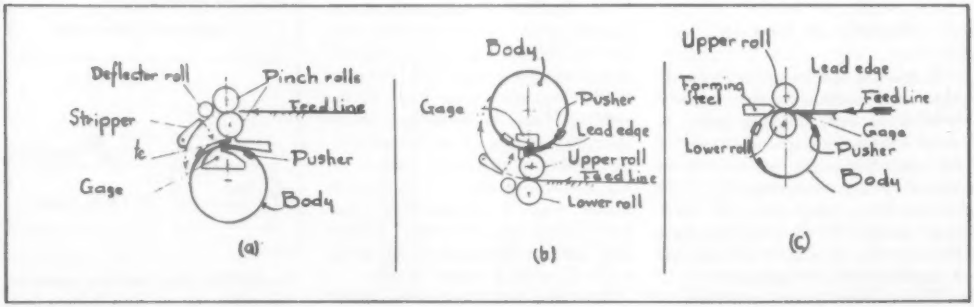


2—EACH IMPULSE of heat acts with the forging action of the welding wheels to expand the lap edge of the seam. Key to letters given in text

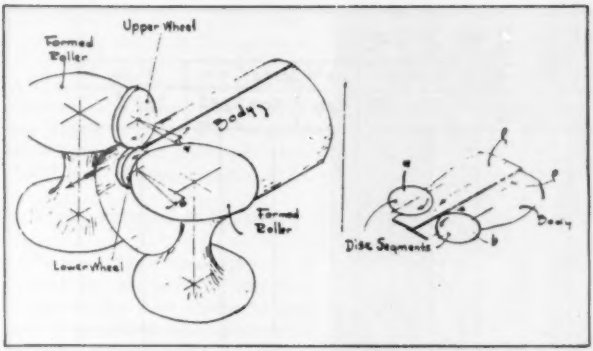
BY C. S. SELTZER
Swift Electric Welder Co.

SEAM WELDING of containers with automatic equipment demands greater accuracy and uniformity in processing than is required with manually operated equipment. The fundamental difference between the two manufacturing methods is the absence of the visual work inspection incident to the operator's task. Moreover, such items as the duty cycle, increased production, feeding the work to and through the machines, control of the work radially and longitudinally, become more critical functions in automatic equipment.

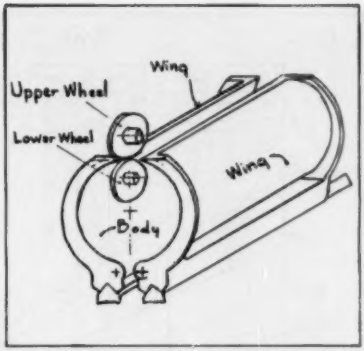
The stock welded in this investigation was between Nos. 18 to 28 gage mild steel. Slitters, shearing or blanking presses are usually employed for sheet sizing. In automatic production,



1—THREE types of forming and gaging arrangements (explained in text) for sheet-steel seam-welded containers



5—SKEW WHEELS (set at an angle) are a second method of lap expansion control. The formed rollers also help to draw laps inward



6—WING-TYPE work-holding fixture is the third way to control lap expansion

Seam Weld Containers*

precleaning of the fay metal is virtually imperative. There are two well proved methods of lap cleaning: grinding and abrasive blasting. The lap grinder produces a pattern on the top and bottom lap surfaces of each girth edge of approximately 0.002 in. to 0.005 in. by 3/8 in. wide, or to suit requirements.

The abrasive lap cleaning method replaces the wheels with blasting nozzles. These nozzles impinge a blast of fine abrasive powder on the marginal surfaces and produce a very satisfactory pattern. The abrasive is recovered, cleaned and later recirculated through the system.

Sheet Feeding and Forming

There are at least three well proved methods of transporting the prepared sheet to the receiving machine: skid stack feeding, connecting conveyor and coil feeding. Of the several sheet forming methods, Fig. 1 (*a*) contains greater assurance of consistent performance. In operation, the sheet passes through the pinch rolls and the leading edge of the work contacts the deflector roll and is deflected downward in the direction of the arrow until it comes to rest at the gage. The stripper positions the trailing edge on the opposite side of the gage. The pusher then advances to square the trailing height edges and transports the assembly to and through the welding station.

The three sketches of Fig. 1 show various relations of the gage to the forming rolls. At *a*, the gage is positioned directly beneath and slightly off the center of the lower pinch roll. At *b*, the gage has a similar relation to the upper pinch roll, but the body is pitched upward. In this arrangement, a view of the vital functioning of the machine is obstructed by the body. At *c*, the gage is part of the feed line and is positioned as closely as practicable to the roll. A forming steel is positioned on the opposite side of the lower roll but set slightly lower than the feed line. The sheet passes through the rolls and is deflected downward as at *a*. In this case, however, the trailing and leading edges do not overlap until stripped from the former rolls. This scheme is adapted for lighter gage stock and smaller diameters to avoid stressing the metal beyond safe limits. In all three cases, the gages are usually continuous from forming to welding.

Thermal Lap Expansion

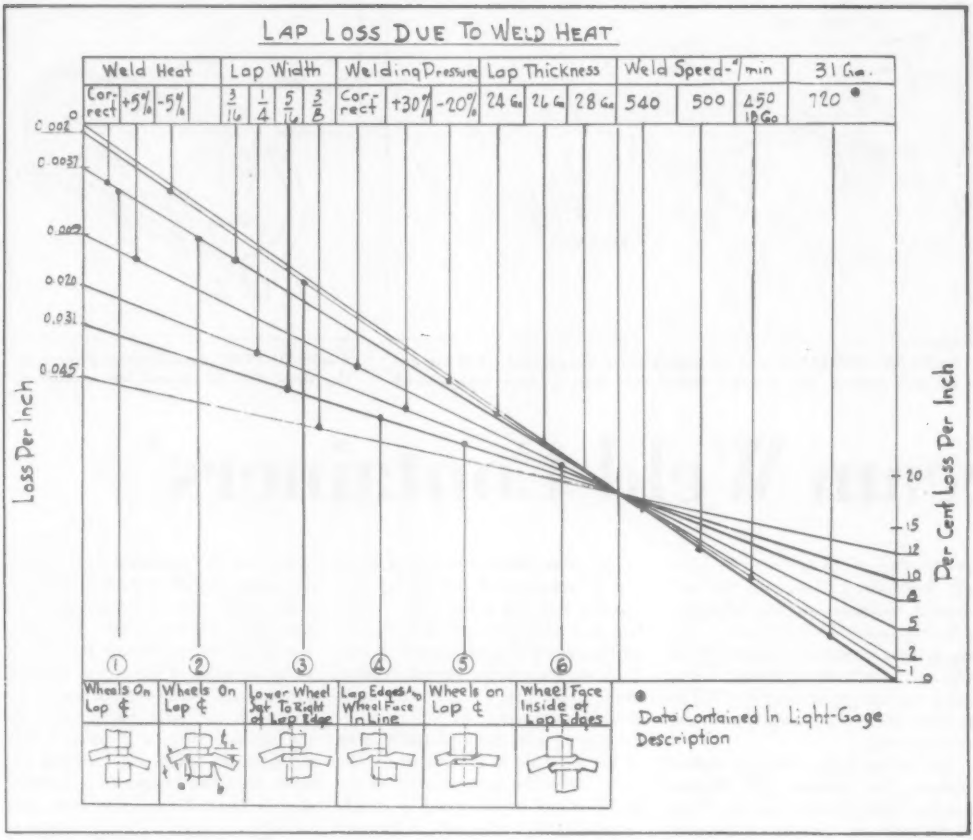
If we are to expect consistently satisfactory seams under automatic operating conditions, some means must be devised to control lap spread during the weld. Our data indicate that thermal lap expansion is the principal cause of this difficulty.

Fig 2 *b* is a section along the line of seam that shows the relation of the nuggets at 9 in. per second welding speed and the preheated increment *i*. The larger sketch on the left of Fig. 2 is a partial transverse centerline section at the welding wheels. The seam lap, *l*, is passing through the wheels in the direction of the arrow. The full pressure and weld current is concentrated on the mass $l \cdot l_1 \cdot x = v$, or the vitazone. When *v* is raised to fusing heat, the increment *i* (which extends from the nugget to a distance slightly beyond) has also been preheated to at least a forging temperature.

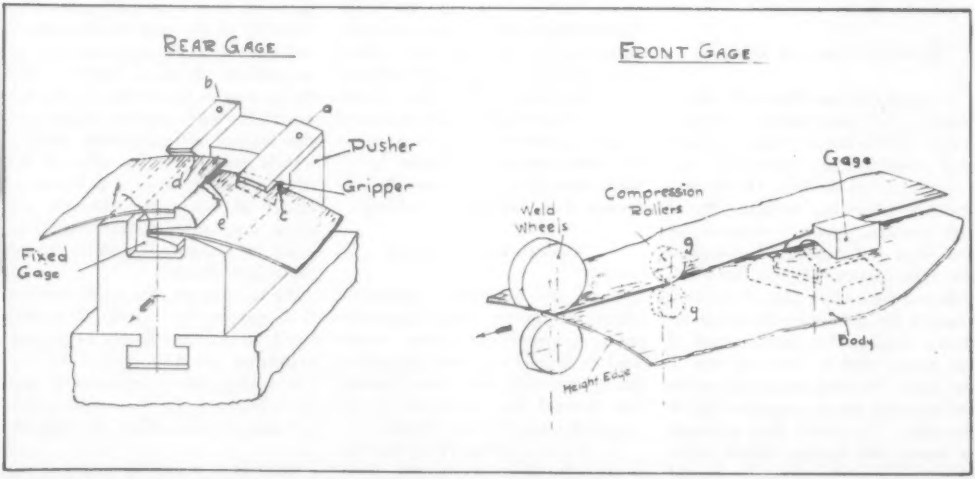
The area $l \cdot i$ represents the preheated zone. This is surrounded by the cooler base metal *c* (Fig. 2*a*). The behavior of the heat in this area is very similar to the moment curve of a cantilever beam of length *l* with the support at line *o*; this is also the lap width. Each impulse of heat and the forging action of the welding wheels expand the lap edge of the seam in the direction of *f*. The magnitude of this value, although not great, may under certain conditions cause the complete loss of lap before the weld is finished.

As an example, the weld speed is 9 in. per second, current 60 cycles, lap 3/16 in., seam length 14 in. and expansion per half cycle 0.001 in. The welding time is expressed in current frequency, 60/9 = 6.66 cycles per inch of weld. Since we weld on

*Abstract of a paper presented at the 32nd annual meeting of the American Welding Society, Oct. 18, 1951.



7—TO READ this chart, go downward in selected column to where the end of the vertical line intersects a diagonal. Follow the diagonal to left scale to read lap loss or to right to get the percentage of loss per inch



8—REAR and front gages of an apparatus for lap-seam control that includes many features described in text

half cycles, $2 \times 6.66 = 13.32$ welding impulses per inch. The spread is $13 \times 0.001 \times 14$ in. $= 0.152$ in. in 14 in.; our lap width is 0.187 in. Moreover, a pressure reading adjacent to the weld station with the above operating condition indicated a tangential force of approximately 20 lb.

Three Methods of Control

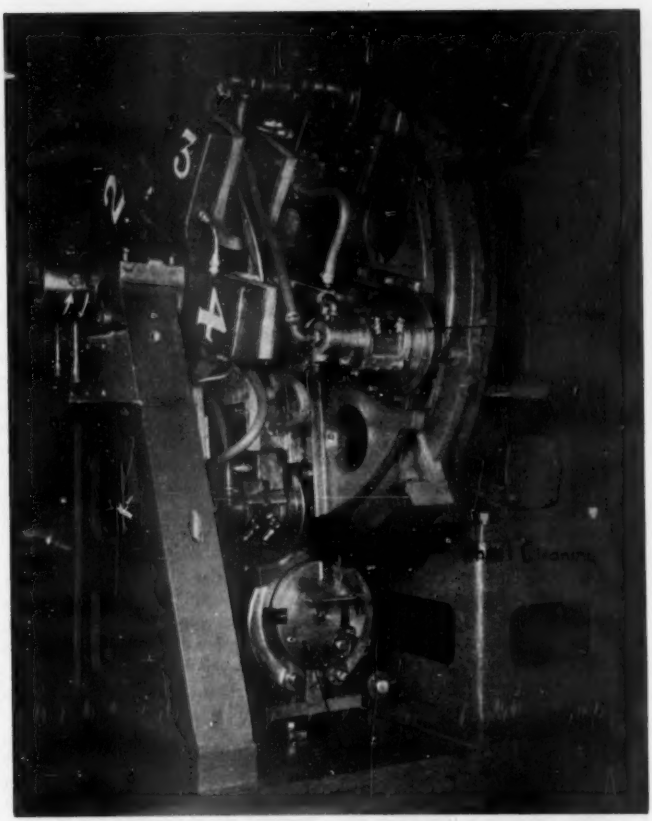
The need for a means to control thermal lap expansion is generally recognized, but there appears to be a lack of agreement with reference to the most efficient means of achieving it.

Spot tacking: The most common method employs two machines and two operators. The first machine, Fig. 3, receives the formed sheet at the gage. The lap is assembled, and the leading edge of the work pressed to alignment at stop. Spot-welding electrodes tack the lap in position; tacking is repeated at spacings of approximately 4 in. The tacked shell is then placed between the seam-welding wheels of Fig. 4 and, at the start, guided manually. When the seam is welded, the wheels are retracted and the shell is withdrawn.

This arrangement constrains the lateral lap expansion (explained by Fig. 2) between the spot welds. The internal stresses set up in the surrounding metal while the seam is welded are also somewhat dampened by the spot anchors. Although the two-machine arrangement does assure a uniform lap, it suffers from the disadvantage of high labor costs and low output. It has not proved practicable to combine both units into a single machine because the maintenance, operating and adjustments become too complicated.

Skew welding wheels: Another method of lap control (Fig. 5) sets both wheels at angles to the axis alignment. The skew wheels are expected to draw the laps inward as the seam passes through the wheels. Our experiments with this scheme have not proved very encouraging. With the aid of formed rollers, however, the lap may be controlled successfully.

Work-holding fixture: Still another development is a wing-type work-holding fixture, Fig. 6. In this arrangement, the formed shell is deposited in a transporting fixture; the wings envelop the work and advance toward the welding wheels. The work is then stripped from the fixture by the power-drawn welding wheels. The fixture then retracts to repeat the operation. An earlier development was to employ traveling welding wheels and a stationary fixture. There are several mechanical disadvantages to both arrangements, the most important of which is the comparatively low duty cycle because of high inertia values.



9—AUTOMATIC welder for seam welding of light-metal containers. The large rotating wheel contains five complete electrode-wheel assemblies

Although each of these three arrangements embodies some desirable characteristics, we believe the optimum equipment for the task should embody the best of all three and also include consideration of the data contained in Fig. 7. These data were obtained from tests conducted on 26-gage 1010 cold-rolled sheet stock. The lap was 3/16 in. and the seam 13¾ in. long (except where otherwise noted). The work was held in position with formed rollers at the welding station.

As an example of how to use this chart, it is desired to know the lap loss due to weld heat for a lap width of 5/16 in. Find the section titled "lap width" and run down the 5/16-in. column until the vertical line stops at the intersection with a diagonal. Follow this diagonal to the left to read a 0.031-in. loss per inch of length. Follow the diagonal to the right to find that this represents a 10% loss per unit length.

The results of the diagrammatic wheel-setting sketches at the bottom of the table may be ascertained similarly. These results multiplied by the length of the seam equal the total lap spread with the known conditions. In some cases, the lap was entirely lost before the end of the seam; in other cases the loss was slight.

The numbered wheel and lap relations shown at the bottom of Fig. 7 may be explained as follows:

(1) A normal wheel alignment. The centerline of the wheel and lap coincide. This was the relation used to obtain the data in the tabulation.

(2) Shows the lap thickness t_1 following the current initiation. Points *a*, *b* were believed to have a lap spreading effect. This was not excessive as compared to the analysis of Fig. 2.

(3) The lower wheel is set to the right of the inner lap edge, the intention being to concentrate the welding pressure upon the outer lap edge. This was expected to produce a track and thus prevent spatter. The results were satisfactory but cannot be maintained.

(4) The lap edge and the faces of the wheels are in line. In this case, the lap was entirely lost at 12 in. from the start.

(5) A typical mash weld resulting from excessive pressure. This prevents splatter but accelerates the lap spread. This type of weld is a manufacturing requirement with some pail makers but requires more frequent wheel attention.

(6) In this scheme, the wheels were set to produce a slight track on both lap edges. It was expected to reduce the lap spread. Although there was a slight improvement in lap alignment, mechanical difficulties discouraged its use for production work.

Therefore, from this data, we should expect lap seam control apparatus to include: (a) correct welding current for the task, (b) correct welding pressure, (c) minimum lap width, (d) welding wheels lap-centered, (e) lap to be preset before welding, (f) a mechanical means adjacent the wheels to resist lap spread, (g) the wheels mounted on a normal axis with reference to the work, (h) wheels wider than lap width, (i) wheel perimeter cleared of foreign inclusions, (j) minimum friction at wheel shaft journals, and (k) minimum abrasion on work surface.

We believe Fig. 8 embodies these features and offers the most dependable assurance of obtaining continued high-speed production.

The pusher contains the edge grippers *a*, *b*. As the pusher advances in the direction of the arrow, the grippers align the trailing edges of the work at *c* and *d*. The lap as set by gage is also retained at these points. The leading girth edges *e* and *f* pass through the front gage. The work advances until these edges reach the compression rolls, *g*. These maintain the lap setting while welding and function somewhat similar to the spot tacking previously described. Moreover, they also permit the pusher to be retracted and repeat the feeding cycle before the weld is completed. The duty cycle of the machine is thereby greatly improved.

Gripping of the lap edges as described permits the lap to be preset to compensate for thermal expansion and also virtually eliminates the necessity for aggressive body-supporting pressure with consequent mutilation of lithographed stock. This apparatus, with slight modifications, may also be employed for producing constant diameters rather than constant lap sizing.

It may be well to add a note of caution with reference to work removal after welding. It is very important to continue the work control beyond the completed weld cycle to avoid any possibility of loss of lap relation to the wheel.

Containers of Lighter Gages

For container stock of gages under No. 28, we found that the conventional inner and outer welding wheel assembly would not meet the production requirements of the light-metal container industry. Figure 9 shows the welding station of the machine that represents our solution.

The main rotor, revolving continuously, comprises five complete weld-wheel assemblies. Each of these contact the work at the splined horn, while restraining wings envelop both the work and the horn. As the wheel contacts the work, the current is initiated, and current continues to flow until the wheel has passed over the full length of the seam. Welding pressure is applied by air through the core of the rotor spindle. At the completion of the weld, the restraining wings are opened; the welded body ejected; the second body positioned on the horn and expanded to diameter; the wings closed. These operations occur while the wheels move through the "dwell" arc of the rotor. Rectified current is conducted to the rotor through specially designed brush contacts.

With rectified current and this welding apparatus, welding speed is limited only by the condition that was found to arise when the movement of the wheels was greatly increased. As the lap in contact with the wheel reached the plastic range, the upset pressure appeared to lag the current and perform its function of forging beyond the vitazone region.

In conclusion, we have presented the critical conditions inherent in this type of automatic equipment and have offered proved methods of controlling the important functions. In the heavier gage equipment, it has been shown that the actual weld is not the most difficult problem of the fabrication. To expect continuous automatic production of a commercial quality, it is very essential to provide the machines with accurately prepared stock.

For lighter gage containers, we have explored various means of improving the welding speed and have presented rectified current as the optimum for this task.

SAVED STEEL, CUT COSTS

(Continued from page 27)

these plates was fillet welded at one end to the web of the diagonal or vertical, while the other end was fitted and welded between the flanges of the chord. The fitting and welding would have been considerably more difficult if butt welds had been used for these connections.

Connection of diagonals and vertical to the top chord is pictured in Fig. 3 and in the drawing, Fig. 4.

Fabricating the Trusses

The trusses, like the rest of the structural steel, were fabricated at the Verona, Pa., plant of The Ingalls Iron Works Co. Elaborate jigs, special locating and clamping devices were not needed as the members were heavy enough to hold themselves in correct relative position during fitting and tack welding. The truss members were assembled for fitting and welding on carefully leveled skids (see Fig. 1).

Before a beam member was laid down on the skid, its ends were beveled by a portable oxyacetylene cutting machine (Fig. 5). A joint that has been fitted and tack welded appears in Fig. 6. A similar joint

after finish welding is in Fig. 7.

Most of the welding could be done in the flat position with the trusses lying on one side or the other. When welds were completed on one side, a bridge crane lifted the truss (Fig. 8) and turned it over to permit the other side to be welded. While being turned, the truss could be held in a vertical position long enough to permit a few welds to be made on the web connection plates. This avoided vertical welding.

All butt welds were of the single-bevel type and were welded from both sides in order to assure complete penetration. Special care was taken to provide sound metal at the ends of the welds, where the arc was started or terminated. Electrodes were of AWS classification E-6012, the type most commonly used for structural fabrication.

In fitting the truss joints, extra care was required to allow for rolling-mill dimensional tolerances and for "out-of-square" wide-flange H-sections. However, no serious difficulties were encountered in getting a proper fit.

Theory of Design

Other parts of the structural frames of the hospital additions were designed as simple frameworks; that is to say that the beams were assumed to be simply supported. Wind bracing connections (see bottom of Fig. 9) generally have a top plate that is connected to the column by a full-section butt weld and to the top flange of the girder by fillet welds. At mid-length of the top plate is an unwelded portion that provides adequate material for a small amount of self-limiting plastic stretch.

This type of connection was first described in the book *Arc-Welded Steel Frame Structures* by G. D. Fish (McGraw-Hill Book Co., New York 18, N.Y., 1933). It has now come into widespread use. The design assumes that when any combination of gravity and wind loading produces a total stress in the connection exceeding the yield point, the stress will be relieved by plastic stretch in the unwelded portion of the top plate. After such a top plate has been subjected to the maximum tension resulting from combined loadings, its subsequent behavior will be of an elastic nature, in the case of this building.

In general, the details of column bases and splices, beam-end-connections and built-up girders followed common practices that have become well standardized for welded building construction. However, it's worthwhile to examine the special details that are sketched in Fig. 9.

Cantilever Girders

At both the cellar and ground floors of the maternity annex, the reactions of some columns adjacent to existing building walls had to be transferred by cantilever girders to bearing plates set in 3 ft 3 in. from the column centerline. The webs of the wide-flange beams that acted as the cantilever girders had to be reinforced by shear plates. Also, bearing stiffeners made of flat plates were placed under the columns and over the bearing plates. These stiffeners were butt welded at the ends that bear against the inside surface of the girder flanges. Had fillet welds been used, it would have been necessary to mill the bearing ends.

Another detail of special interest, also shown in Fig. 9, is the design for some laborntory building girders that carry column loads. The beams that frame in at these locations are connected to load-bearing stiffeners under the column. A special bracket connection for offset spandrel beams appears at the left of Fig. 9.

No Noise of Riveting

Erection of steel at the buiding site progressed very much in the same way as riveted construction. In accordance with the practice that widely prevails for welded building construction, holes to accommodate erection bolts and drift pins were provided at structural connections. Insofar as possible, such holes were located in connection material or in light members that could be handled easily. None of the heavy truss members had to be punched.

The use of welding for this hospital addition afforded one big special advantage: sound-sensitive patients were not tortured by the noise of riveting. Though this humane consideration was the primary reason for choosing welding, welded construction could have been selected solely upon its merits as a cost saver.

At one time a steel contractor would likely consider that he would be doing well if fabrication and erection costs on a welded building ran about the same as for riveting so that he could realize the full cost savings afforded by the savings in material. But more and more fabricators are finding that they can also reduce fabrication and erection costs by using welding, provided that the structure is properly designed.

One reason why steel erectors are developing efficient organizations for handling welded work is the shortage of erection riveters. This shortage dates back from World War II, when so many more weldors than riveters were trained for defense and war production industries.

• • •

The plans for the $7,000,000 project were prepared by Kahn & Jacobs, architects, and Severud-Elstad-Krueger, structural engineers, with York & Sawyer, serving as consulting architects. Gilbert D. Fish, consulting engineer, designed the welded joints, connections and special members such as trusses and girders. The Thompson-Starrett Co. was the general contractor. The structural steel was fabricated at the Verona, Pa., plant of The Ingalls Iron Works Co., of Birmingham, Ala., and erected by the Karl Koch Erecting Co., Bronx, New York. The field welding was done by Craftsmen Welders, Inc., Brooklyn.

All construction work was under the direction of Alfred Rheinstein, chairman of the Mt. Sinai Hospital building committee, under whom the Ingalls company was a prime contractor.

"Cut the clowning and stop submerging!"

BOSOMY lady weldor at Metal Show poses for the cameraman with welding friends. She's Dagmar (cardboard)

WELDING ENGINEER display booth at the Metal Show. Many stopped in to see us. We hope you did, too.

A Very Good Metal Show!

The 33rd Metal Show was like a good state fair—colorful booths, exciting new products, big crowds, shirt-sleeve weather

BY W. C. HENZLIK

THE beautiful Indian Summer weather probably contributed to the record-breaking attendance figures of this year's Metal Show. Some 75,000 engineers, production men, researchers and management representatives registered at Building A on the Michigan State Fair Grounds, near Detroit, during the week of Oct. 15-19. The Metal Show and its sister events, the National Metal Congress and the World Metallurgical Congress, attracted visitors from every state and from nearly every nation located on our side of the Iron Curtain.

The big attendance was chalked up despite the inconvenience of driving out eight miles from the downtown hotel section or taking a specially chartered bus. Another obstacle to show viewing was that the 400 or so exhibits were distributed in seven large display buildings and two meeting halls located on a 25-acre area. Despite the travel and the strenuous walking, however, the show was well worth-while.

Welding-wise, several new developments were spotlighted. One of the most promising was a weldable tungsten carbide for putting on thin, ultra-hard coatings by the inert-arc process. This new rod is still in an "engineering appraisal" stage, and is not in actual production.

Two new automatic welding heads were on working display, one with an automatic handling fixture. Also, a new inert-gas process in which a filler metal is automatically fed into a tungsten arc. Another new product being demonstrated was an experimental stud-welding gun utilizing a carbon arc to make blind spot welds.

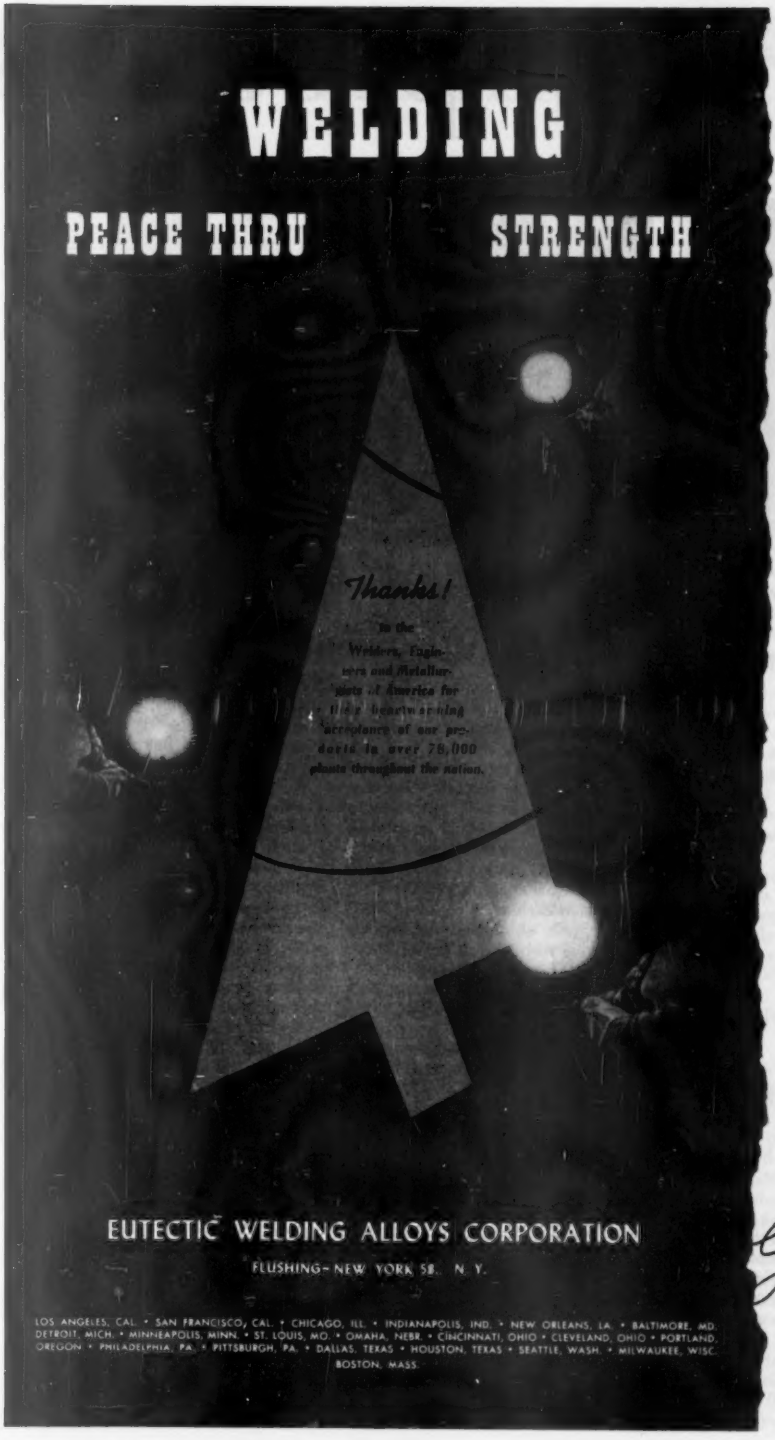
Most of the welding product booths were larger this year than previously and had more company men in attendance. Equipment was a little short, though, as eager customers wanted welding equipment so badly they wouldn't allow the manufacturer to show it at the exposition. Conspicuous by their absence for this reason were large flame-cutting machines.

A brisk interchange of orders and queries went on throughout the show as suppliers and fabricators met each other. One electrode manufacturer regretfully turned down a check-on-the-counter $5,000 order for electrodes he couldn't get steel for. Many welding positioners on the floor had "sold" signs plastered on them.

Attractive displays were manned by the Air Force, the Navy, several universities and the French iron and steel industry. Cutaway jet engines, mock-up models of airplanes, ships, torpedoes, bombs, guns, rockets and other ordnance material were on display. Pictures from the Naval Research Laboratory showed activities there in welding and allied research fields. Photomap displays of various French steel mills and raw materials suppliers attracted many visitors.

Most pleasant of the non-technical aspects of the Show were the beautiful models—10 or 12 gals of cover-girl rating in every building. As good as the boardwalk at Atlantic City, this Metal Show! Besides looking at the girls, the visitor could take chances on various articles of merchandise. If he gave a good answer on the welding of stainless alloys, he might win a set of leather luggage. A correct estimate of the length of several gage blocks set end to end could win a new chronograph watch.

When the lights went out Friday afternoon and the movers started crating up the machinery and the booths, everyone knew one thing—it was one of the biggest and best Metal Shows.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Welders, Engineers and Metallurgists of America for their heartwarming acceptance of our products in over 75,000 plants throughout the nation.

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OUR PLEDGE TO YOU FOR '52...

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For the coming year . . as we have throughout the past decade . . . we shall continue our efforts to serve American Industry and the Defense effort with:

★ the most advanced research program devoted to the development of new welding speeds and savings . . . already responsible for the development of more than 150 different welding rods, electrodes and special fluxes—

★ a fully-trained staff of over 200 District Engineers to help you solve your welding problems right in your own shop—

★ a continuous service of Technical information bulletins, leaflets, and manuals on production welding as well as on vital maintenance work—

★ the Eutectic Welding Institute to teach advanced welding techniques to those who are concerned with maximum safety and efficiencies—

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—in short, a fully rounded program dedicated to serving YOU to the very best of our ability throughout the coming year.

PRESIDENT

Season's Greetings

New products

COOLING downdraft keeps plate rectifier welder at its peak form

VERY HARD coatings on wear parts seen with experimental rod

SPECIAL holder for silver brazing flux saves time and money

D-C Rectifier Welder

NEW heavy duty direct current welder manufactured by A. O. Smith utilizes selenium rectifier stacks cooled by a high velocity down draft. Extensive tests on the rectifier stacks show no tendency to failure since the cooling air keeps them in top condition. The air is drawn down over the stacks before passing through any of the rest of the machine and is expelled at the welder base. The fan is of case-diameter and the cover is of special design to promote cooling. The primary coils are raised and lowered on ball bearing jacks. It comes in 200, 300 and 400 amp ratings.

A. O. SMITH CORP., Welding Products Div., Milwaukee 1.

* * *

3,000-Lb Portable Hoist Operates on Ratchet

A NEW 3,000-lb capacity hoist-binder works on the ratchet hoist principle. It will take up or slack off a load chain any amount up to a full 20½ in. For rapid take-up, full strokes can be used; for smaller adjustments, half strokes. The binder chain may be pulled freely through the ratchet when not under load. There are no buttons, levers or locking devices. The handle can be removed to prevent tampering —this locks the hoist on load.

COFFING HOIST CO., 800 Walter St., Danville, Ill.

Test New Hard-Facing

EXTENSIVE tests on a new "weldable" tungsten carbide show that it can be flowed onto metal surfaces, using the inert-gas-shielded arc process. Not yet in production, the new rod has been made experimentally in sizes ranging from 1/16 to ¼ in. diameter. When flowed onto steel or iron it fuses and blends with the base metal, says the company and results in a surface coating containing about 70% of tungsten carbide.

Wear tests show that the surface has a wear-resisting ability of about 80% that of undiluted tungsten carbide and about 15 to 20 times that of the best chilled cast irons of 43 to 67 Rockwell. Data on the latter comparison was obtained using an aluminum oxide dry abrasion test.

CARBOLOY DEPARTMENT of General Electric Co., Detroit 32, Mich.

* * *

Rustproofing Oil Keeps Unpainted Weldments Clean

FOR protecting welded components or subassemblies until such time as they are finally assembled or painted, there is a new rustproofing semi-drying oil, "No. 20 Protex." After application on metal, it dries to a waxy film that inhibits the formation of rust and guards against corrosion. A sample will be furnished.

WAYNE CHEMICAL PRODUCTS CO., 9800 Copeland St., Detroit 17.

Heated Flux Pot

BY keeping silver brazing flux at the optimum consistency and by making available every ounce of it, a new "Dipwell" heated flux pot is said to save its cost in a few weeks.

The flux pot eliminates the use of glass containers standing around. With this pot, enough flux can be heated to fill porcelain enameled wide-mouth containers for individual operators. Purchasing of flux in 30 lb packages or 65 lb drums permits the saving of money also. Stock room space is also saved with the larger packages.

Heat is transferred to the flux through the porcelain enamel pot by means of circulating hot water. The latter is heated by an immersion heater. Water compartment is stainless steel and the insulation is fibreglass.

Capacity of the pot is 45 lb of fluoride flux. A Pyrex glass level indicator shows the water level at all times. A thermostat keeps the water at a constant temperature for the best flux condition.

BOYD WELDING CO., 8th and Holland Sts., Erie, Pa.

* * *

6-Lb Air Sander Has Reciprocating Movement

OPERATING on 70 psi air, a new "Easy" air-powered sander has a reciprocating or back-and-forth movement that permits sanding up to

for welding

New savings for you may result from a new plate rectifier welder, an experimental hard-facing rod, a special fluxpot, a small spot welder, new welding goggles and shields

right-angle corners and doesn't cut abrasive patterns. Sander weighs only 6 lb and has a comfortable one-hand grip for downhand use as well as a front handle for overhead or other awkward applications. It takes 3 2/3 by 9 in. sheets of abrasive.

DETROIT SURFACING MACHINE CO., 1333 East Eight Mile Rd., Detroit 20.

* * *

64 New Face Shields Announced by Sellstrom

CULMINATION of more than 12 years of research into face shield design is the announcement of **64 new models** by Sellstrom Mfg. Co. There are nine basic designs each with a variety of clear and green windows in different shapes and sizes.

Brand new features includes a special fastener that holds tighter than any previous model. A double swivel hinge attached to the headgear permits the wearer to raise or lower the window by two in.

SELLSTROM MFG. CO., 626 No. Aberdeen St., Chicago 22.

* * *

Accessory Clamp Holds Material in Bender

A NEW quick-acting clamp made by O'Neil-Irwin will fit all No. 2 and No. 3 Di-Acro benders now in use. It is readily mounted by bolting it on the bender base. It securely locks tubing, angles, channels and extrusions to the bender during forming operations. Its wide opening jaws allow easy removal of the formed part.

O'NEIL-IRWIN MFG. CO., Lake City, Minn.

Plastic Headrest Goggle for Gas Welding, Cutting

A COMPLETELY new one-cup headrest goggle is recommended for gas welding, flame cutting and brazing. Made of one-piece molded plastic with a large ventilated inside area, it bears firmly against cheeks and forehead to exclude light and heat. Its dimensions are large enough to go over prescription glasses or safety glasses. The plastic headrest is readily adjusted for size and distributes the weight evenly over the head. Telescopic arms with concealed springs allow raising or lowering with one hand in one second. The goggle is also available with elastic headband.

The lens, made in shades No. 3 through 6 in standard 2 by 4¼-in. size, is protected by a cover glass and can be easily replaced without special tools.

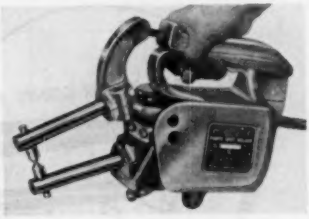
JACKSON PRODUCTS, Warren, Mich.

* * *

High-Strength Welds Made in Cast Iron

NEW "EutecTrode 26" electrode for arc welding cast iron is said to differ from conventional electrodes in that the deposited metal shows an evenly distributed carbon content. This has the effect of strengthening the weld, according to the company.

EUTECTIC WELDING ALLOYS CORP., Dept. P, 172nd St. and Northern Blvd., Flushing, N. Y.



Portable Spot Welder for Auto Body Shops

A new portable spot welder features a semiautomatic timing control and a new leverage system for exerting high forging pressure on spot welds. It weighs 24½ lb, including arms, electrodes and power cable.

An automatic switch connected to the welder handle turns on the welding current when the toggle-type electrode arms hold the workpiece at maximum pressure. Called the Model 275, the welder uses 220-240 volt power, single-phase. A 50-amp fuse is recommended. Welding capacity is a ⅛-in. combined thickness of either mild or stainless steel. There are 6-in., two-in-one electrode arms and four electrodes—two 45-deg and two 90-deg models. The welder carries a one-year guarantee against defective materials and workmanship.

MARQUETTE MFG. CO., 307 East Hennepin Ave., Minneapolis 14, Minn.

* * *

High-Speed Hole Saw with Welded Teeth

New line of high-speed hole saws can be used to cut holes up to 4½-in. in diameter through hard and mild steels, aluminum, brass, bronze, steel pipe, plastics, etc. They utilize a special high-speed steel edge welded to a tough alloy steel back.

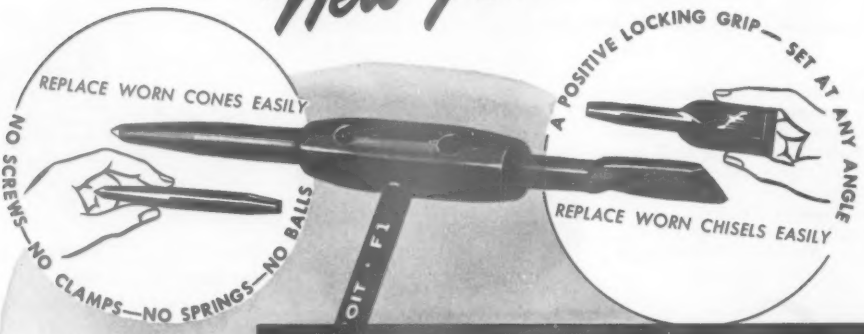
Called "Blu-Mol," they can be used in portable power drills with ¼-in. chuck for the smaller sizes, ½-in. chuck for the larger ones.

MILLERS FALLS CO., Greenfield, Mass.

* * *

(More New Products on Page 88)

There's Never Been Anything Like It For *New Features!*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The New ATLAS Tomahawk

Reg U.S. Patent Off.

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Gets into pockets and corners
Longer Life
Wider edge for faster chipping
Set at any angle for convenience
Simple locking taper for fast replacement

THE BEST TOOL COSTS THE LEAST

—Because you use it over and over—Replace only the lost cost bits—just as you replace only the tip in your cutting torch.

Model E 1 — Flexo handle — 12 ounces
Model F 1W — Flexo handle — 16 ounces
Model E 1W — wood handle — 12 ounces
Model F 1W — wood handle — 16 ounces

Chip the edges off your chipping tool costs —ask your local welding supply dealer to show you this Atlas tool!

Atlas WELDING ACCESSORIES CO.
707 E. LEWISTON AVENUE FERNDALE 20. (DETROIT) MICH.

Cutting-Tip Numbers Compared by Drill Size of Cutting-Oxygen Orifice

(When cleaning tips, it is recommended that one size smaller drill be used)

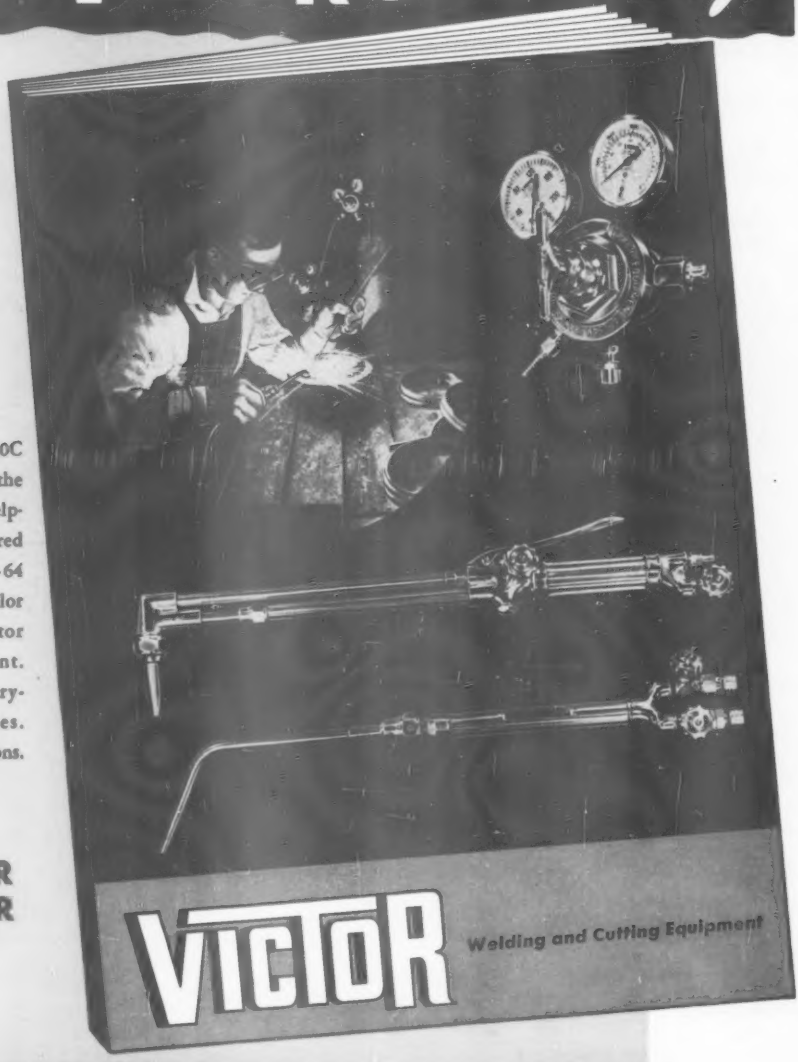
Tradename	DRILL SIZE ▶ Series	79 80 78	77 75 76	73 74 72	71 69 70	67 68 66	65 63 64	61 62 60	59 57 58	55 56 54	53 52 1/16"	50 51 49
Airco	124, 144, 164 195, 198, 199					00		0		1 2	3	4
Craftsman	B							1		2	3	4
Dockson	All							1		2		3
Gasweld	HC-31, HC-32, HC-39[1] WC-20[1], WC-35[1] WC-10[1], WC-55[1]				00	0 0		1	2	1	2	
Harris	2890-F 6290 7490-A				00	00	0	0 00	0	1 1 1 2	2	2 3
K-G	M4, M5					68[2]		62		56	53	50
Marquette	E[1] C, D[1], D1[1.3] C, D[1], D1[1.4]						1B	2B 0A 0A		1A 1A	2A	2A
Meco	All					0[5]			1	2		
Milburn	X-100 X-2000 X-2300						00 00	0 0	1 1	1 2 2	2	3 3
National	All							0	1	2		3
Oxweld	CW-29[1] CW-23[1], C-31, C-32		2 2			3		4 4			6	
Prest-O-Weld	CW-109[1] CW-110[1], C-111						0	1 1			2	
Purox	33[1] 34, 35					0		1 1		2		3
Rego	All					68		62		56	53	51
Smith	Lifetime, Longlife[1.3] Lifetime, Longlife[1.4] Airline[1], Midline[1]						0 1	0 2		1 2 1 3 3 5	3 2 4	
Torchweld	280, 250, 251					68[6]		62		56	53	51
Victor	All			000			00		0	1	2	3
Weldit	S-25, S-37, S-45									1	2	

Tradename	DRILL SIZE ▶ Series	47 48 46	45 43 44	41 42 40	39 37 38	35 36 34	33 31 32	1/8" 29 30	27 28 26	25 23 24	21 22 20	19 17 18
Airco	124, 144, 164, 195, 198, 199		5	6		7		8	9			10[7]
Craftsman	B		5	6		7						
Dockson	All		4			5	6		7 8			
Gasweld	HC-31, HC-32, HC-39, WC-20[1], WC-35[1]		3			4 5						
Harris	2890-F 6290 7490-A		3 3	4		4 4 5	5	5 6				
K-G	M4, M5 M6		45	40		35		30		25		
Marquette	C, D[1], D1[1.3] C, D[1], D1[1.4]		3A		3A 4A[8]			4A 5A	6A			
Meco	All		3			4		5	6			
Milburn	X-100 X-2000 X-2300	3 4	4 5 4	5 6 5	7 7	8 8 8	9	10 11 7	12 8		9	10 11[9]
National	All	4		5	6		7	8				
Oxweld	CW-23[1], C-31 C-32	8			10		12					
Prest-O-Weld	CW-110[1], C-111	3				4 5						
Purox	35		4									
Rego	All	46		42		35		30		25		
Smith	Lifetime, Longlife[1.3] Lifetime, Longlife[1.4]	4 3		4				5		6		
Torchweld	280, 250, 251	46		42		35		30		25		18[11]
Victor	All		4 5			6			7			
Weldit	S-25, S-37, S-45		3			4		5				

[1]Cutting Attachment. [2]Applies to M4 only. [3]Preheat: 4 flames. [4]Preheat: 6 flames. [5]Also 00 with 3 flame preheat. [6]Applies to 280 only. [7]Tip size 11 drill size 10; tip 12 drill 2; tip 13 drill 1/4" and tip 14 drill L. [8]Remaining tips for C only. [9]Tip 12 drill size 15. [10]Tip next size larger is drill size 12.

NOW AVAILABLE

New VICTOR Catalog



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For Your Technical Library—
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A Welding Engineer Reader Service

1 RECTIFIER WELDER — A. O. Smith Corp., Milwaukee 1. Literature tells about the new A. O. Smith alternator rectifier d-c welder in 300, 500 and 800 amp ratings. Cooling, current and other construction principles are explained in detail. See page 46.

2 ONE-PIECE WELDING GOGGLE —Jackson Products, Warren, Mich. Single-sheet bulletin shows the new "Uni-goggle," a one-piece bonnet goggle for gas welding, cutting and brazing. It describes the goggle, lens and headband and lists replacement parts. See page 47.

3 ALLOY WELDING ELECTRODES —Alloy Rods Co., York, Pa. 12-page bulletin No. AR551 gives hitherto hard-to-get facts about stainless, armor-type, and superalloy type welding electrodes for fabricating jet engines, tanks, ships, airplanes. This valuable booklet discusses the 19-9, Type 308 Mo, 308 ELC, N-155 and 17-4 PH electrodes.

4 HOW TO GAS WELD—National Welding Equipment Co., San Francisco. 24-page completely illustrated booklet tells how to properly operate a gas welding or cutting torch. Practical hints are contained and given on torch lighting, adjusting the regulator, cleaning the tips, etc. Booklet was prepared for students of vocational training schools.

5 HARD-FACING RODS—Victor Equipment Co., San Francisco 7. Five new bulletins tell about Victor "Tungsenoth" fine mesh tungsten carbide electrodes and rods, "Victorstite" tungsten carbide electrodes and rods and "Victor-alloy," a fabricated rod containing alloys in a tube.

6 SPOT WELD TIP DRESSER—C. O. Porter Machinery Co., Grand Rapids, Mich. Literature tells about the new Porter flash type electrode tip dresser for dressing straight or tapered spot welding tips without removing them from the welder. Its two-part, reamer and blade construction is explained and other features discussed. See page 48.

7 ARC WELDING CATALOG—Hobart Brothers Co., Troy, O. New 16-page, completely illustrated arc welding accessories catalog lists headshields, goggles, lenses, metallic and carbon electrode holders, cable, connectors, clamps, cleaning tools, protective clothing, gloves, electrodes and books on welding.

8 BRASS WELDING RODS — The American Brass Co., Waterbury 20, Conn. 24-page Bulletin No. B-13 discusses copper and copper alloy welding rods and metal welding techniques for brass as the oxyacetylene torch, metal arc, carbon-arc and inert-arc. U. S. Navy and other specs are also included.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four items.

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9 AIRCOMATIC CATALOG—Air Reduction, New York City 17. New catalog ADC 717 describes the "Aircomatic" gun for manual use, the head for automatic applications and the special electrode wires for use with either type equipment. Photos and sketches of the equipment are supplemented by on-the-job illustrations of various applications.

10 WELDING NICKEL PIPE—The International Nickel Co., New York City 5, 27-page bulletin T-17 tells all about the fabrication of nickel and high-nickel alloy pipe and tubing. Its tables on mechanical and physical properties, ASME code rules, recommended welding procedures are accompanied by drawings and photos.

11 EUTECTIC WELDING CHART—Eutectic Welding Alloys Corp., Flushing, N. Y. New 19 by 24 in. wall chart gives specifications of 200 Eutectic metal-joining alloys, including bonding temperatures, tensile strengths, applications, welding procedures and joint preparation.

12 SILVER BRAZING FLUX POT—Lepel Welding Co., Edgewood, Pa. 4-page folder tells about a new compact heat flux pot for brazing or melt-on 50 lb of silver brazing flux at the proper working consistency. Construction of the pot and its advantages are shown. See page 46.

13 PORTABLE SPOT WELDER — Harnischfeger Mfg. Co., Minneapolis, Minn. Literature tells about new "Porta-Spot" welder Model No. 215 for welding spot welds in body repair shops, small factories and plants. Specifications and construction are described. See page 47.

14 RUSTPROOFING OIL — Wayne Chemical Products Co., Detroit 17. Bulletin tells about "No. 20 Protex," a thin, semi-drying oil for depositing a waxy film of protection on weldments, sheet metal and other ferrous parts to prevent rust and corrosion.

15 PAINT ANCHORING — Oxygen Process, Inc., Staten Island 1, N. Y. 8-page booklet tells about "Anchorite 100," a paint-anchoring corrosion-resistant phosphate for pre-painting treatment of steel, zinc and cadmium.

16 QUICK-LIFT WINDOW—The Arcair Mfg. Co., Colchester, Ill. Single-sheet bulletin tells about the Arcair quick-lift window for arc welding helmets. Designed for attachment to any standard helmet, it operates by air supplied by a mouthpiece inside the helmet.

17 POSITIONING COMPOUND—Superior Welding Alloys Corp., Flushing, N. Y. Bulletin 5007 describes a plastic cement compound, "Form-A-Jig" for holding small parts together for welding. Also useful for protecting against heat or flame, it has been used as a mold for solder, aluminum, lead, etc.

18 COPPER BASE ALLOYS—Bridgeport Brass Co., Bridgeport 2, Conn., 4-page folder lists 70 common brass and copper alloys along with their compositions, mechanical properties, forms and typical uses. It is said to be useful to designers, fabricators and purchasing agents.

19 INDUCTION WELDING — General Electric Co., Schenectady 5, N. Y. 12-page, two-color bulletin No. GEA-6479 shows equipment for induction welding and heating applications such as forge welding, heating drill bits, heating of spring strip and surface hardening.

20 INERT-ARC APPLICATION—Ampco Metal, Inc., Milwaukee 46. Ampco Welding News gives an informative case history of fabricating of idler drums for guiding service valve bars, called "Ampco Tuf-Loy" with the inert gas consumable electrode process.

21 LOW HEAT SILVER BRAZING—American Platinum Works, Newark, N. J. 48-page pocket-size manual represents a complete library on low temperature silver brazing including 50 drawings and charts. It tells about alloys, preformed shapes, fluxing, heating methods, cleaning, inspection, thermal expansion, etc.

22 AIRLESS BLAST CLEANING — American Wheelabrator & Equipment Corp., Mishawaka, Ind. Bulletin No. 794 tells how to remove rust, scale and sand from castings, forgings, weldments, etc., with Wheelabrator's "airless blast" method. Preparing the surfaces of engine heads for metallizing, loading gear lubricants for cadmium plating, etc., is also covered.

23 ELECTRONIC WEIGHING—Streeter Amet Co., Chicago 13. Booklet tells about the new "Ametron" scale for electronic weighing and recording of small weights of steel plates, welded components, scrap, etc. See page 90.

24 STUD WELDING DESIGN—Nelson Stud Welding Div., Gregory Industries, Inc., Lorain, O. 8-page manual on how to design for stud welding gives production men valuable specifications on stud selection guides, template design, stud clearances and provisions for fillets.

25 DEFENSE WELDING — Eutectic Welding Alloys Corp., Flushing, N.Y. Plastic-bound data file contains 100 pages of illustrated technical data on maintenance and repair welding problems and procedures likely to be handy with present shortages of materials and machinery.

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Our Defense Program Faces a Crisis

A major crisis will soon confront our defense program.

It is not a crisis in raw materials. To find enough materials, from steel to cobalt, for defense production is a serious problem. But it is one that is being solved.

It is not a crisis in manpower. Shortages of workers with special skills hamper production, but these shortages are being relieved, slowly.

It is not a crisis in manufacturing capacity. American industry's record-breaking expansion is, with very few exceptions, keeping abreast of defense needs.

The coming crisis will be one of finance. It will rise from our failure to provide the means to PAY FOR the defense program we now have under way.

A $15 Billion Deficit?

Congress has approved a defense program which is scheduled to raise *total* federal spending in the year from June, 1952, to June, 1953, to somewhere between $85 and $90 billion. Additional appropriations for more air power and atomic development, which are now proposed, would add several billion dollars.

But Congress has not approved a tax plan to match such spending. With the new levies enacted in this session, tax collections during the 1952-53 fiscal year are estimated to fall somewhere between $70 and $75 billion. That would be roughly $15 billion short of balancing the budget. If the defense program is expanded, the deficit will be that much greater.

We have not yet felt the impact of the crisis that would accompany a federal deficit of this magnitude. Federal tax collections currently are big enough to balance federal expenditures. But the defense program is scheduled to boost the annual rate of federal expenditures $25 billion in the next year.

To Meet the Crisis

By January the crisis will be clearly in sight.

Then the President will present his budget. After that, Congress must act to close the broad gap between government income and government spending. If it fails to do that, the whole defense program will be menaced by weakness in its financial foundations. That weakness might well take the form of another destructive wave of inflation.

We have three ways to meet this crisis.

The best approach, of course, is to cut unessential expenditures. That can make a real dent in the deficit. The second is to collect more

taxes. The third, and by all odds the most dangerous, is to have the federal government meet its deficit by going deeper into debt. Borrowing, which might feed inflation, can easily lead to disaster.

Near Income Tax Limits

It will not be possible to raise taxes to meet the deficit merely by increasing further the rates on corporations and on persons in the upper income brackets. Congress has about scraped the bottom of that barrel.

The Senate Finance Committee said as much in reporting this year's tax bill. The Committee reported that it had "serious doubts as to the feasibility of raising any substantial additional amounts of revenue from income tax sources." The Committee observed that recent tax legislation brings the burdens of most corporate and individual income taxpayers close to the World War II peaks, and actually carries the rates paid by many taxpayers above those peaks.

Our ramshackle federal tax system must be thoroughly overhauled in order to broaden the tax base if it is to produce more revenue—without doing much more harm than good.

The shocking fact is that no one seems ready to act along any line that might enable us to surmount the crisis.

That fact of itself aggravates the coming crisis. And next year's presidential election doesn't make it any easier to move effectively. Both parties will shrink even more than normally from backing any program that might irritate any considerable number of voters.

If we are to meet this crisis on the tax front in an orderly way, the technical work should be in progress right now. To a large extent it is being ignored.

If we are to enforce the vitally essential program of government economy, there is the same urgent need to get under way the spade work that is required.

And if—as a last miserable expedient—we decide to let the federal government drift deeper into debt, it must have a well-developed program of borrowing from individuals and other investors, such as insurance companies, rather than from the commercial banks. Borrowing from commercial banks might speedily translate the deficit into more and more price inflation. No adequate program of borrowing from savings is now in sight.

Now Is the Time

It is possible, of course, that international relations may improve sufficiently to make it safe for us to slow down the rearmament program. If that should happen, the fiscal crisis would not be so critical. But that kind of good fortune has been notably absent in recent years.

Lenin, patron saint of Communism, is quoted to the effect that to destroy a political and social system such as ours "you must debauch its money."

We shall set democracy to digging its own grave if, through our preoccupation with politics during the presidential campaign, we pave the way for further debauchery of our money.

If we really want to avert that disaster, now is the time for us to get going.

Once the crisis is full upon us, it will be too late.

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Protection plus substantial savings! You get both when you order PENOPTIC quality safety lenses direct from the manufacturer. These lenses, both clear and absorptive, actually *exceed* all Federal specifications. They're heat-treated and hardened for complete eye protection. Available in 50 mm. round, 47 mm. drop eye and 44 mm. drop eye. For prices and descriptive information on the complete PENOPTIC line of safety and welding lenses, write to

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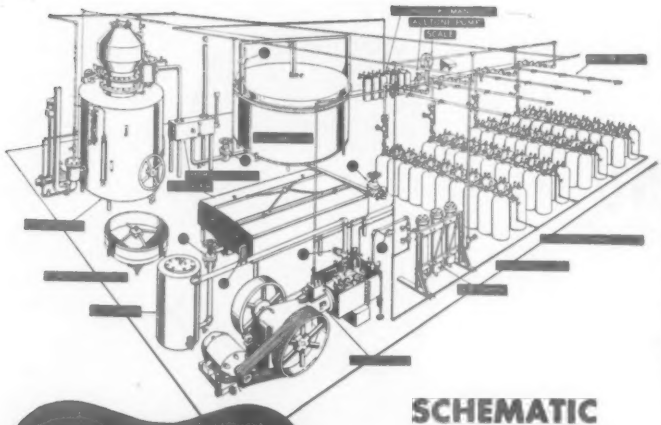

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PLANT
that Charges up to
160 CYLINDERS
at ONE TIME

SCHEMATIC PLANT ASSEMBLY

SHOWING LOCATION OF UNITS THAT MAKE UP THE PLANT

This plant layout provides simplest operation at low production costs. Compact design allows operator to watch all operations at all times.

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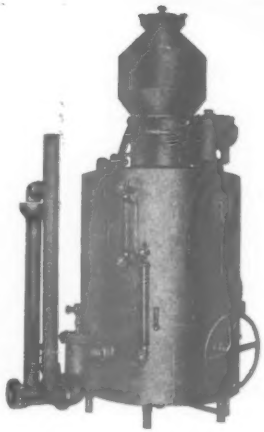
This 600-lb. acetylene generator fits into the above plant assembly. It stands out as one of the safest plants manufactured. Automatic controls minimize operating personnel. Rated capacity of the generator and plant assembly is 2700 cu. ft. per hour. The other units are designed for maximum production at minimum costs.



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O'FALLON 5, ILLINOIS

WELDING SUPER ALLOYS

(Continued from page 37)

at 2,102 F for 10 minutes, water quenched and held at the specified test temperature for 30 minutes before they were tensile tested.

Defects have been avoided by maintaining temperatures at levels insufficient to cause poor ductility in areas adjacent to a weld. For example, the aforementioned liners were welded in place by directing most of the heat toward the heavy steel plate and allowing only the edge of the arc or flame to melt the light-gage lining alloy.

Though unusually stable, superalloys are sometimes susceptible to slight precipitation in the grain boundaries when they are held in the critical temperature range (about 1,000-2,000 F) for long periods of time. This causes an accelerated rate of attack in heat-affected areas. From the corrosion standpoint, however, the effect may be so slight that post-weld annealing is unnecessary.

Welded superalloy assemblies have been annealed or otherwise heat-treated and age hardened where special properties, for instance maximum resistance to corrosive chemicals, are necessary. However, neither age hardening nor postweld heat treating other than annealing are extensively employed in connection with superalloys at the Stainless Steel Products plant. The high operational temperatures of jet aircraft engines will usually enable the superalloy assemblies to acquire a desirable degree of hardness and inertness.

Inspection Methods

Government specifications necessitate exhaustive inspections—X-rays, ultrasonic testers, dye-penetrant and magnetic-particle inspection, etc.—for all components of jet-propelled aircraft. These inspections have disclosed defects of the types described, but virtually all defects could be attributed to a lack of experience in welding the new alloys.

Says Harley Rubish, president of Stainless Steel Products: "We are now convinced that there is no superalloy welding problems which cannot be satisfactorily and consistently solved with knowledge, first-quality welding and careful planning."

It's true! Acetogen offers a better, cheaper, faster and complete STEEL FABRICATION SERVICE

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faster—

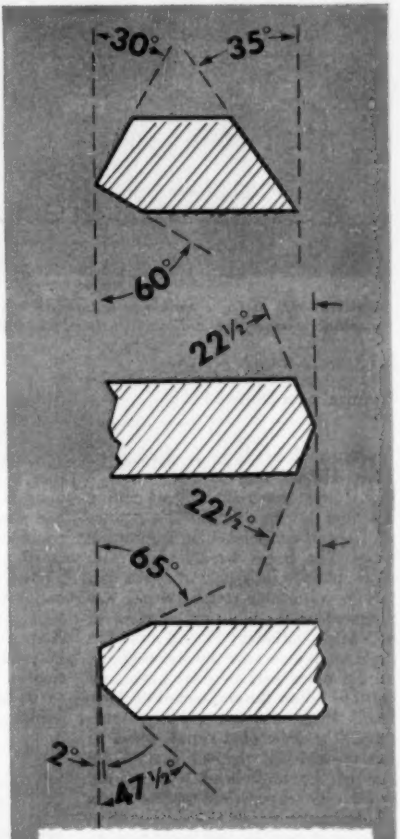
because Acetogen-cutting is infinitely quicker than laborious grinding. In one department, with one plate positioning, with one operator, in one stroke—we make the *finished* cut to the required tolerance. After cutting, the plate is immediately ready for forming, assembly, or other operations.

and complete—

because the brand-new Acetogen plant at Chester, Pa. contains all the tools and equipment necessary to do any fabricating job—including flame-cutting, welding, forming, sub-assembling—on armor plate, low-carbon and high-alloy steels, as well as on all other types of metals. It is operated by men thoroughly experienced in ordnance and aircraft metal-working.

Let us quote on your defense work . . .

Our organization has full security clearance to contract for defense work through the Department of the Army, Philadelphia Ordnance Division. Send us drawings, sketches, or blueprints for any fabricated work that you have, including the most difficult. We will promptly quote price- and time-schedules that will amaze you. Get those drawings *now* and write today! Acetogen Fabricators, Inc., Room 822 Commercial Trust Bldg., Philadelphia 2, Pa.



What do you think of these bevels? They are all found on one piece of armor plate that we are now fabricating in quantity. Other fabricators would have to *grind* these edges to required tolerances. Our *flame-cutting* achieves the same exact tolerances—and we pass the savings in time and money on to the customer!

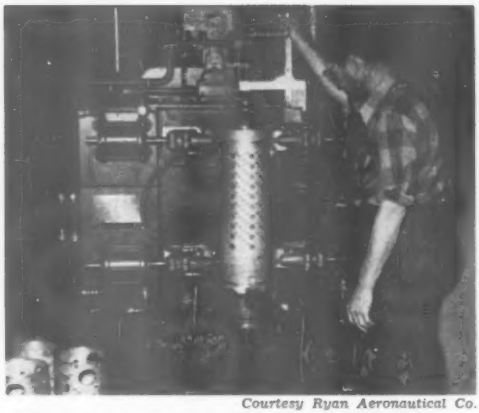
ACETOGEN FABRICATORS, INC.

Originators of precision flame-cutting

on the job

Courtesy Oxweld Railroad Service Co.

DISHED HEAD for a tank car is beveled with cutting machine mounted on horizontal arm of big boring mill



Courtesy Ryan Aeronautical Co.

POST SPOT-TACKER makes four welds in jet-engine parts, then rotates the assembly for further welding

Trimming a Dainty Dish

(See left photo)

DISHED tank heads 12 ft in diameter were beveled for welding with a three-torch heavy-duty flame-cutting machine at the Sharon, Pa., plant of General-American Transportation Corp. The heads were dished from ¾-in. plate to form part of a tank car.

The adjustable torch block was mounted on the tool-support member of a large stationary boring mill. The horizontal arm was counterweighted at the other end to float back and forth to follow the contour of the tank head, which was mounted on a turntable. The air-cooled riding wheel of the torch block pressed against the rim of the tank head to keep the torches in correct position. The heads were simultaneously finished with a bevel and nose in one revolution of the turntable. Cutting speed was about 14 ipm.

* * *

Untanking Tower

A RIGID-FRAME structure fabricated by welding steel plates was built at cost of $10,000 to assist in moving in nine 30,000-kva transformers at the new Bothell substation of Seattle's City Light. The hoisting mechanism mounted on top of the tower was formerly used at the municipal power system's Ross Dam hydro plant. The new "untanking tower" is said to be less expensive than the usual type since the mild year-'round climate of Seattle renders an enclosed structure unnecessary.

The nine 30,000-kva single-phase autotransformers at Bothell substation will receive current at 230,000 volts from the Skagit River project and step it down to 115,000 volts for transmission to the Broad St. and North receiving substations.

Bothell substation, transmission and switching station, will be the terminus of four 230,000-volt lines from the Skagit project, and two 230,000-volt lines to South substation as well as the 115,000-volt lines to Broad St. and North stations. It will also interconnect with the Bonneville Power administration through its Snohomish substation.

WELDED "untanking tower" helps move transformer into substation

* * *

"Four at One Blow"

(See right photo)

ONE OF the most specialized welding machines ever devised was recently installed at Ryan Aeronautical Co., San Diego, to perform an unique operation on a single part for a jet engine. It makes four simultaneous spot welds.

Described as a "post spot-tacking machine," this tool serves as both an assembly and fabrication machine in the manufacture of inner combustion chambers for the General Electric J-47 jet engine. It quickly aligns the three major parts of the combustion chamber and spot-tacks them together prior to seam welding.

Most striking feature of the machine is a brass-and-copper arbor, which serves double duty as an alignment tool and a central electrode. At the top and bottom of the arbor there are expanding sections consisting of four pie-shaped segments. The movement of a tapered pin (actuated by an air cylinder) expands these segments into the assembly. Four horizontal electrodes move simultaneously against the expanded sections to discharge their welding current.

In operation, the combustion chamber shell, exit shell and cap are placed on the arbor. With a touch of a foot switch, the expanding sections

move outward, bringing the assembly into exact alignment and concentricity. Another foot control causes the electrodes to move in and fire, making four spot-tacks at each impulse. The assembly is rotated (automatically) so that a total of 32 spot-tacks can be accomplished in eight swift rotations.

Previously, the assembly of this structure required two employees: one to assemble the parts in a jig and another to hold the heavy, unwieldy jig in a spot welder while single spot welds were made. Now one machine operator can assemble the combustion chambers five times as fast as two employees could formerly accomplish the work.

Because of the satisfactory performance of the new equipment, Ryan is acquiring another machine of this unusual design.

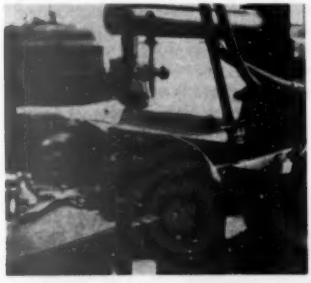
• • •

Electrode Shaped to Jaws

A WELDING CLAMP manufacturer—the Petersen Mfg. Co., of De Witt, Nebr.—has developed spot welding electrodes with special faces to do the job of welding the clamp jaw to the clamp body.

The upper electrode is grooved to hold the clamp body, and the lower electrode contains a plate to position and hold the serrated clamp jaw. Both components are made of silicon-manganese steel.

After the spot weld has accurately positioned and anchored the jaw, the assembly goes to a furnace brazing operation that joins every faying surface of the jaw and clamp body. The jaws are prepared for furnace brazing by coating them with copper before they reach the spot-welding station. This introduces a complication: the good conductivity of copper renders it extremely difficult to spot weld through a coating of it. Hence it is necessary to buff or grind free of copper a small area at the location of the weld.



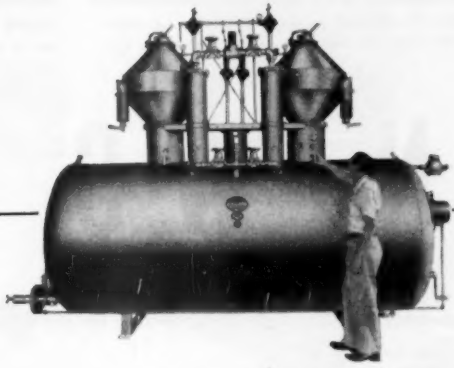
UPPER electrode holds body of clamp; lower electrode holds jaw

FOR WELDING AND CUTTING

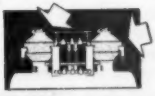
A CONTINUOUS FLOW OF ACETYLENE IN YOUR PLANT!

. . . AND YOU'LL SAVE UP TO 75% OF YOUR PRESENT COST OF ACETYLENE WITH THE VIRTUALLY AUTOMATIC

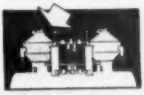
SIGHT FEED MODEL A-TWIN GENERATOR



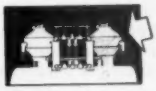
...AND THIS IS HOW



Two hoppers supply the carbide—each operates independently of the other. Start service by filling hoppers, simultaneously metering required amount of water into tank.



When hopper No. 1 is empty, meter fresh water into tank. Hopper No. 2 automatically goes into service. Automatic drain valve opens to release excess water and residue.



Refill hopper No. 1 . . . and acetylene production goes on continuously, without waste of acetylene through purging. No loss of time handling cylinders in and out of plant.

Yes, you'll save plenty with the convenient, dependable Model A-Twin . . . as much as 75% of your present cost for acetylene. Write or call today for Catalog 250-N.

WELDING Sight Feed EQUIPMENT

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THE SIGHT FEED GENERATOR COMPANY

WEST ALEXANDRIA OHIO, U.S.A.

LONG LINE of turbojet engines shows production gains made by huge Westinghouse plant at Kansas City

FARM SCRAP pile 50-ft long will soon be on its way to a steel furnace. Farms are scrap "gold mines"

NEWS

Westinghouse Jet Engines Pour Off Assembly Lines

TURBOJET engines for Navy and Air Force fighter planes are coming off the final assembly line at the Westinghouse Kansas City plant only hours apart. The 85-acre plant has production aisles a quarter of a mile long and is said to be the largest and most complete jet engine factory in the world.

Most material enters the plant as stainless steel sheets and castings as well as aluminum and magnesium castings and forgings, according to S. S. Stine, manager of the Kansas City works. Multiple processing lines for shearing, bending, welding, machining, fitting and subassembling flank the quarter-mile long row of production offices, tool cribs and tool and pattern makers shops down the center of the main production facilities. A complete forge shop for the fashioning of compressor blades and mass production casting facilities for precision casting of turbine blades are included in the plant.

Engineering, development, design functions and prototype production for the Westinghouse Aviation Gas Turbine Division are performed at the division headquarters at the South Philadelphia, Pa., works.

A battery of huge concrete test cells provides means for block-testing each engine as it comes off the assembly line and to test it again after its "green run" tear-down and inspection.

* * *

Farm-Ranch Scrap Drive Brings In Old Machinery

RURAL areas are considered by defense officials to have huge quantities of high grade scrap iron and steel, copper, brass and aluminum. Getting it back into the charging furnaces, however, takes some doing.

Just ended is a 30-day nationwide farm and ranch "scrap harvest" sponsored by the Department of Agriculture. The full weight of 30,000 state, county and township scrap committees was thrown in the fight to get the scrap on its way to the mills.

Typical of the men who gather and ship farm scrap to our hungry steel furnaces is Boyd Worley, owner of the Norfolk Salvage Co., Norfolk, Nebr. Only in the business five years, he started out with one oxyacetylene cutting torch and an old truck just after the war.

Yet, the first five months of 1951 saw 54 railroad cars of scrap leave his yard, some 40 tons of old tractors, balers, rakes, wheels and other farm machinery in each of them. He keeps his 20 employees busy driving four scrap collecting trucks, flame-cutting heavy scrap and baling it or scouting out new sources of scrap.

Equipment in use at Norfolk Salvage includes a power shear, a sheet metal baler, a crane, a boom truck and three flatbed trucks, besides five oxyacetylene cutting outfits. To speed his work he has been striving to get an electromagnet for his crane, but the thickets of red tape in Washington pretty effectively blocked his efforts.

Though he has as many as 200 old autos in his yard at one time waiting to be cut up, the biggest part of Mr. Worley's scrap comes from the surrounding farm and ranch territory. The right photo above shows a 50-ft pile of cut down farm implements, steel-wheeled farm tractors, wrecked windmills, etc. in back of Mr. Worley (at left).

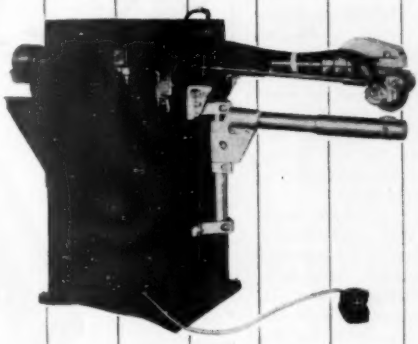
Spotting the scrap isn't easy because his men roam an 8,000 sq mile territory, but they have some help. Jimmy Morgan, a cowboy-ballad singer on Norfolk's radio station WJAG is sponsored by Mr. Worley and his announcements between songs tell northeast Nebraska farmers about the prices he pays for scrap. He also advertises in local newspapers.

An old light plant at Carroll, Nebr., when its metals were salvaged, yielded 39 tons of iron and 2 tons of copper. Several more such finds can be expected, says Mr. Worley. Snow-plow blades that have been badly damaged in the severe winters in Nebraska and other worn-out road machinery also provide a steady influx of scrap.

As yet still a gleam in Mr. Worley's eye are some old "oil-pull" tractors that came out to the wheat fields more than 30 years ago. Each one of them, when it finally gasps its last, contains five to eight tons of scrap. Some ancient steam-powered threshers are also likely prospects.

Banner SEAM WELDERS

SPECIALLY MADE TO MEET THE NEED FOR A SMALLER SEAM WELDER



BANNER 50 KVA ROCKER ARM SEAM WELDER

Here is a Banner Rocker Arm Seam Welder built to handle up to 20 gauge mild steel and lighter—a job usually requiring larger, more costly machines. This 50-KVA Model has 24" throat with the upper wheel driven through shafts and pinion gears. Positive drive originates from a Graham vari-speed transmission mounted at the rear of the machine • Shafts are securely mounted in floating bearings with universal joints. The machine shown above has a lower horn for longitudinal welding, but is easily converted to circular seam welding by installing a special lower horn and rotating the upper head 90 degrees (merely loosen four bolts and re-connect the drive from the Grahma speed reducer • Transformer is fully water-cooled and rated at 100% duty cycle to handle a multitude of applications on high production 20 gauge (and lighter) mild steel. *Write for details!*

30 KVA CIRCULAR SEAM WELDER

This seam welder is specially designed for use on lighter materials (26 and 28 gauge mild steel). It has many outstanding features usually found on larger, more expensive machines • Lower wheel is driven by small fractional horsepower motor through gears • A multitude of speed combinations and ratios are quickly and easily made by changing gears • Positive drive (gear driven) • All current-conducting members are of high conductivity, high strength materials • Transformer is fully water-cooled and rated at 100% duty cycle • Upper and lower shafts are also water-cooled, facilitating high production • Upper ram follows Banner's pattern of rugged construction with a long bearing surface of 7" • Ram is manganese bronze, running in cast iron and guided by a 5/8" pin • Frame is 1/4" boiler plate, with 5/8" reinforced face plate.

BANNER is in a NEW Home!

To meet the growing demand for its welders, Banner announces the opening of larger and greatly expanded facilities for the manufacture of their resistance welding equipment.

Banner manufactures a complete line of Gun, Seam, Rocker Arm and larger Press Welders and Specials to 200 KVA. Inquiries invited.

Specific data sheets and catalog available. Write today!

Banner

BANNER Manufacturing Co.

6822 NORTH 43rd STREET • MILWAUKEE 9, WIS.

Pandjiris Saves 3 ways with Ampco-Trode*

. . . here's how "bronze-facing" with Ampco Electrodes helps cut manufacturing costs on Hydramatic Tube and Pipe Bender

This machine, fully automatic, bends pipe up to 4-inch diameter with 12-gauge wall. The bending head must withstand high working pressures and resist wear. That's why Pandjiris Weldment Co., St. Louis, "bronze-faces" several vital working parts with Ampco-Trode* — Ampco Bronze Electrodes.

The wear-resistant Ampco-Trode 200 overlay provides a good bearing surface, reduces friction and increases service life.

But that's not all—it eliminates the need for castings and 3 costly machining operations.

You, too, can save with Ampco Bronze Electrodes. Get a supply today and let their wear-resistant qualities help you cut both manufacturing and maintenance costs.

(Above) Tube and Pipe-bending machine manufactured by Pandjiris Weldment Co.

(Left) Gibs on slide block forming dies are "bronze-faced" with Ampco-Trode

Ampco Metal, Inc.

Milwaukee 46, Wis.

West Coast Plant: Burbank, California

AMPCO

10-116

It's Production-Wise to Ampco-ize!

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

Check Type of Antifreeze in Engine-Driven Welders

WITH cold weather here, you should certainly have filled the radiators of your engine-driven welders with antifreeze solutions. In addition, you had better check the type of antifreeze you use, says the National Bureau of Standards.

Some antifreezes made with a salt-base or from petroleum distillates are definitely hard on your radiator, says a new NBS booklet, "Automotive Antifreezes." Safe antifreezes for ordinary use are ethylene and propylene glycol as well as the simple alcohols, such as wood alcohol.

Strong corrosion was noted in the tests made with salt-base solutions, says NBS, and the inhibitors filling stations sell didn't stop it. All the metals in the cooling system are affected by such salt-base antifreezes, especially aluminum, which is completely eaten away sometimes.

Not only extensive corrosion and clogging of the radiator can be expected from salt-base antifreezes—the motor block might crack.

Petroleum base antifreezes were found harmful for three different reasons: 1) they are highly inflammable 2) they rapidly cause rubber hose connections to deteriorate and 3) their boiling points are too high. On the latter point, it is possible that the engine could be run so hot that failure could result before the operator would be aware of overheating.

Here's how to identify your antifreeze, if you threw away the containers: soak an old rag in the solution and ignite it—if it burns with a clean, blue flame, its alcohol; if it has a smoky yellow flame, it's a petroleum base solution; if its a salt-base mixture, it won't burn at all.

You can get the booklet by sending 15c to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. and requesting NBS circular 474.

* * *

Dallas Welding Distributor Builds New Plant

CONSTRUCTION is almost complete on a new building for the Dallas Welding Supply Company, Dallas, Tex. A. L. Hill, owner and manager, says the new structure will be two and a half times larger than present quarters. It will have 9,000 sq. ft. of floor space and will be located in Dallas' Trinity Industrial District.

The company handles both gas and arc welding equipment and its wholesale territory covers Dallas and a 75-mile radius.

SPATTER CHATTER

...for even better connections

cam-lok cable connectors

● Looking for a connection that's easy to make as a Saturday night date . . . snug as a movie star's sweater . . . longer lasting than the pyramids? Get the facts on Cam-Lok Welding Cable Connectors. Made from solid brass, Cam-Lok's double-cam principle assures the most perfect contact possible. When connection is made it's vibration and weave-proof. There can be no arcing or burning. You get a perfect, low-resistance contact every time.

General Purpose and Heavy Duty Cam-Lok Cable Connectors and Terminal Lugs are completely interchangeable. You can couple and uncouple all cables and whip ends from No. 2 through 4/0 *without* adapters, quick as a wink. No other connector gives such complete versatility with trouble-free service.

New FREE Catalog

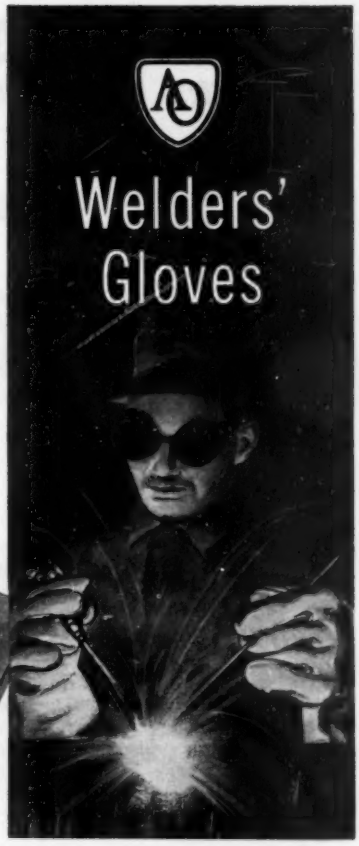
WRITE TODAY

cam-lok

DIVISION OF EMPIRE PRODUCTS INC.

P.O. Box 98-B, Cincinnati 36, Ohio

The Welder's Glove or Mitten **YOU WANT** is Here!



AO Welders' Gloves and Mittens are made from selected chrome-tanned cowhide or horsehide leather, specially tanned for maximum heat resistance. They combine protection with working ease because they are cut to "king" size for freedom and comfort. The leather is tough enough for the hardest service yet remains soft and flexible. Sleeves tuck neatly into gauntlets for secure protection for forearms and wrists. The lining does a 3-way job — helps prevent chafing, absorbs perspiration, gives extra insulation. Your nearest AO Safety Products Representative can supply you.

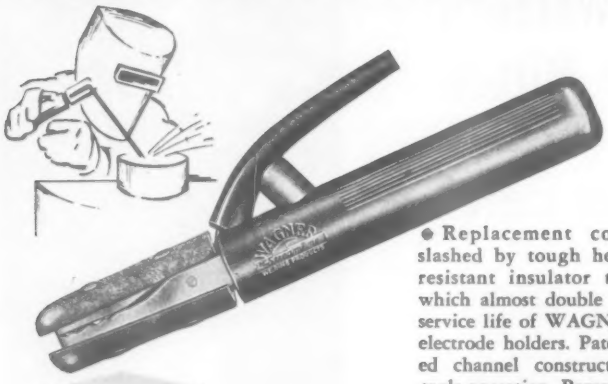
AO's Industrial Vision Program increases *production*, decreases *accidents. Write today for free booklet "Improved Industrial Vision."*

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

WAGNERLOY* CONSTRUCTION

DELIVERS FULL CURRENT TO ARC!



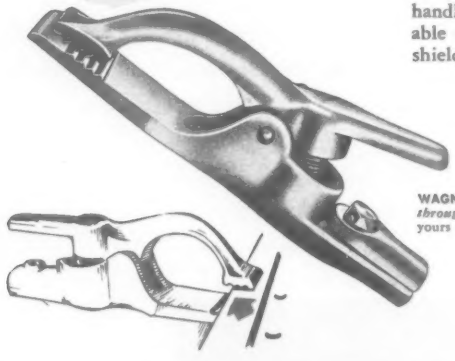
WAGNER ELECTRODE HOLDER with "COPPERHEAD" INSULATOR TIPS

● Replacement costs slashed by tough heat-resistant insulator tips which almost double the service life of WAGNER electrode holders. Patented channel construction cools operation. Powerful coaxial springs of vanadium steel can be instantly adjusted.

STRONGER – LIGHTER – MORE PRACTICAL

* You're sure of full butt-to-jaw power when you weld with WAGNERLOY construction. This specially designed alloy, based on copper, retains most of that metal's unmatched conductivity. Yet WAGNERLOY is stronger than copper – much more resistant to intense arc tempertaures. WAGNERLOY means minimum weight, too. WAGNER'S heaviest electrode holder, for example, weighs but 23 ounces. You find WAGNERLOY only in WAGNER electrode holders and ground clamps.

WAGNER GROUND CLAMPS DIG UNDER FLAT WORK



● Specially designed broad flat base with beveled leading edge may be alternately used as plate or to ground hard-to-handle flat work. Adjustable coaxial spring fully shielded.

WAGNER *products are sold only through authorized dealers – ask yours for a demonstration.*

WAGNER MANUFACTURING CO.

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New Welding Prizes For Undergraduate Papers

IMAGINATION and ingenuity in writing undergraduate papers on welding will pay off this year again in the fifth annual competition of the Lincoln Arc Welding Foundation's Engineering Award and Scholarship Program. Awards totaling $6,750 are to be given for the best papers on design of machines, structures or separate components of either, in which arc welding is the fabricating method.

Complete rules and conditions for the program can be obtained by writing for the 24-page booklet specially printed for this purpose and containing pictures of projects described in previous contests. The address is The James F. Lincoln Arc Welding Foundation, Cleveland 17, O.

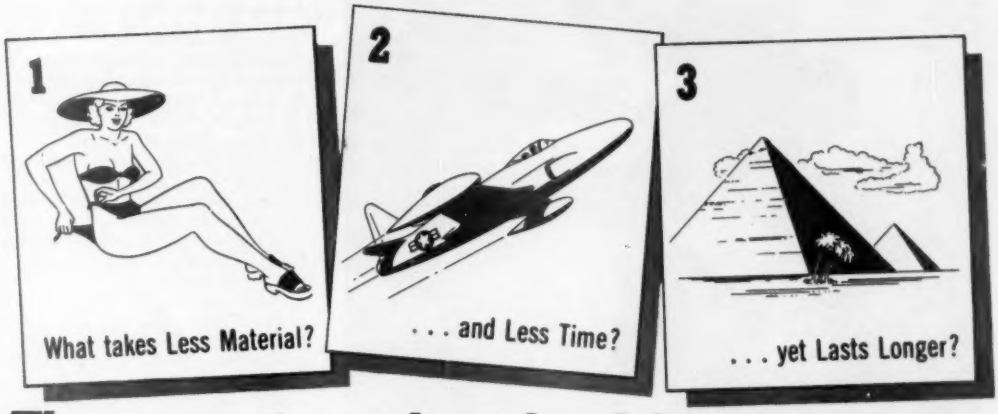
* * *

BOOST for safety goggle sales claimed for storage-display case

Sellstrom Display Case Sells Welding Goggles

TESTS made by the Sellstrom Mfg. Company, Chicago 22, show that a new display cabinet sells 25 to 50% more in "over-the-counter" business. The top section is 15 by 25 by 9½ in. made of natural finish maple. A center compartment has a glass top and displays half a dozen goggles. A side section shows 40 pair of goggle lenses packed in a new Sellstrom window envelope. The other side has 41 welding helmet lenses each packed with cover plate and gasket.

The floor display case is 15 by 25 by 34. in. high and can be used as an ideal base for the top section. The front section holds 6 to 8 dozen pairs of goggles. Special clips on the side of the case display welding helmets. The back of the case will store 10 dozen plates and lenses plus general storage material.



Three questions about hard facing with but one answer–

COLMONOY SPRAYWELD PROCESS*

*A process of *welding* sprayed metal

1. *Less Material* is used with the Sprayweld process than with hand welding because the thickness of the overlay is easily controlled to within .010".

2. *Less Time* is required to spray and fuse than to laboriously apply the overlay with a rod. Most time is saved in finishing the work, the Sprayweld application being much closer to finish dimensions than hand welding.

3. A Sprayweld surface *Lasts Longer* because it is dense and smooth, with no pinholes or porosity. Colmonoy alloys, used in Spraywelding, are highly abrasion and corrosion resistant, and give up to 25 times longer life, than original equipment.

SPRAYWELDER IN ACTION

Stainless steel shaft being sprayed with Colmonoy No. 6. This shaft will last 12 times longer than if unfaced. Colmonoy No. 6 has great resistance to wear and corrosion.

Branches: Long Island City, Buffalo, Chicago, Houston, Los Angeles, Montreal

ORDER FROM YOUR LOCAL JOBBER

WALL COLMONOY
CORPORATION
HARD FACING ALLOYS
[illegible] JOHN R STREET DETROIT 2, MICHIGAN

COLMONOY is a complete line of hard facing alloys; They have various properties and many forms: rod, wire, powder, paste and castings.

The COLMONOY SPRAYWELDER is the powder metallizing gun, shown left. It provides a simple, low-priced method of applying hard facing alloys to withstand corrosion and abrasion.

This is the SPRAYWELD PROCESS. You *spray* the COLMONOY alloy on, then *weld* it by bringing the overlay to a fusing temperature. Thus COLMONOY Spraywelding combines the advantages of two processes: the *smooth application* of metallizing, with the true *molecular bonding* of welding.

Many *worn* parts, commonly discarded, may now be hard faced the Sprayweld way.

Many *new* parts, commonly made of expensive alloy steel, may now be made of mild steel and Spraywelded with COLMONOY.

The process is essentially three steps:

- Preparing the surface by grit blasting.
- Spraying with the COLMONOY SPRAYWELDER or with other metallizing equipment (using COLMONOY SPRAY WELD WIRE).
- The fusion of the overlay using an oxy-acetylene torch.

WALL COLMONOY CORPORATION
19345 John R Street • Detroit 3 • Michigan

Please send me information about Colmonoy hard facing alloys.

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Firm _____

Street _____

City _____ State _____

SINGLE GRINDING PASS gives smooth finish to shells of vertical electric motors.

800% faster weld removal with 3M Abrasive Belts!

LOOK AT THESE RESULTS

When Century Electric Company, Saint Louis, Missouri, installed the modern 3M Grinding Method, production of stator shells jumped from 15 to 125 pieces per hour. New backstand equipment and fast-cutting 3M Abrasive Belts eliminated one entire operation. Plus value: a smoother, more attractive finish on each seam.

Converting your present grinding and polishing equipment to this new system is easily done—and at a minimum cost. The 3M Representative in your locality will be glad to check your present finishing operations—point out ways to increase your production, cut your unit costs. Use the coupon below for free help on your grinding problems.

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Saint Paul 6, Minn.

Please send copy of
"Step Up Production" Booklet.

3M ABRASIVE BELTS

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In Canada: Minn. Mining & Mfg. of Canada, Ltd., London, Canada.

Automatic Welding Builds U. S. Steel Cargo Vessel

SUBMERGED-arc welding played an important part in building the *John G. Munson*, 660-foot limestone carrier, which was to be launched at Manitowoc, Wis., on Nov. 28.

The huge self-unloader will haul limestone from Calcite, Mich., to lower Great Lakes ports for use by steel mills and chemical plants. It was built by Manitowoc Shipbuilding Company for U. S. Steel's Bradley Transportation Co. of Detroit.

Two plates for the 20-ton rudder of the *Munson* were joined together by one of the largest submerged-arc welders ever built. Called "Jungle Jim," the giant welding machine resembles a lifting crane as it rolls back and forth under its own power on 100 feet of track. But instead of lifting equipment, the crane carries a welding unit on the vertical mast near the operator. "Jungle Jim" was called upon to make welds by the mile in the hull and deck plates of the *Munson*.

* * *

Independent Oxygen Manufacturers Re-Elect All Officers

ANNUAL fall business meeting of the Independent Oxygen Manufacturers drew 125 delegates from companies all over the United States, Canada, Hawaii and Mexico. Meeting-place was the Edgewater Beach Hotel in Chicago on Nov. 5-7. Members discussed safety practices, production problems, distribution, accounting practices and the future prospects of the industry.

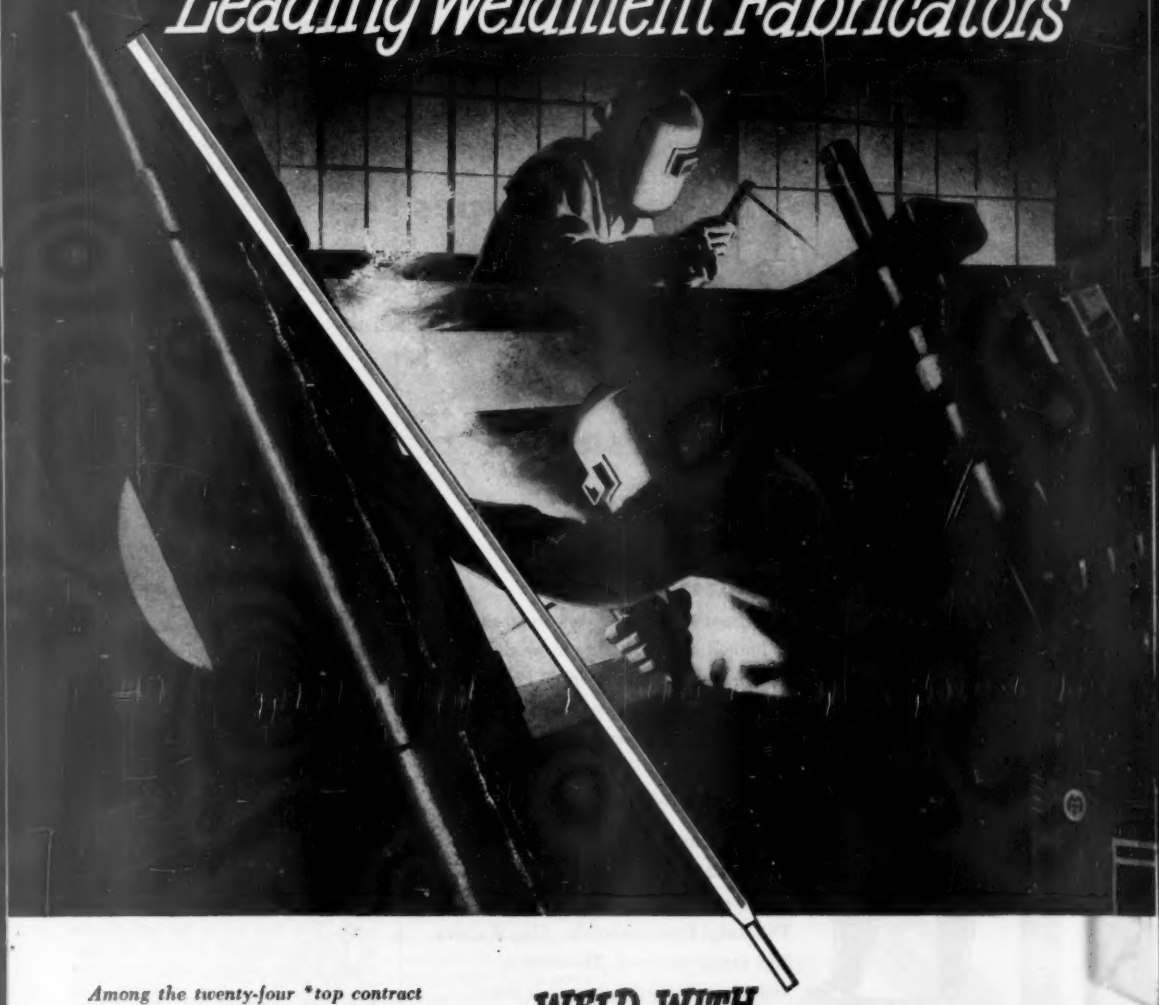
It was decided to extend the terms of office of the present officers and directors who are: Walter Brant, The Indiana Oxygen Co., Indianapolis, president; Marvin White, Welding Gas Products Co., Chattanooga, Tenn., vice-president; J. F. Wagner, The Burdett Oxygen Co., Cleveland, secretary; R. L. Swope, Southern Oxygen Co., Washington, D. C., treasurer; William Josephian, Pacific Oxygen Co., Oakland, Calif., director; Harold Macauley, Wolverine Gas Products, Inc., Saginaw, Mich., director and Allan Renton, Hawaiian Gas Products, Ltd., Honolulu, director.

* * *

Branson Instruments Moves

BRANSON Instruments, Inc., has moved its plant to 430 Fairfield Ave., Stamford, Conn. The new building is twice the size of the former and will enable the company to expand its production of ultrasonic thickness gages, ultrasonic flaw detectors and similar devices.

15 out of 24 Leading Weldment Fabricators



*Among the twenty-four *top contract welding firms, fifteen regularly weld with Murex Electrodes.*

More of the leaders in important industries prefer Murex Electrodes in their welding operations because they can be sure of sound welding—high deposition rates for economy and speed of production.

*Those having AAAA directory ratings.

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ELECTRODES • ARC WELDERS • ACCESSORIES

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WELDING ELECTRODES
Armor Welding Electrodes
... and All Standard Types
AC or DC ... the BEST
... for any weld
on all types
of stainless steel

STAINLESS STEEL
has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.

PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. ***Be sure . . . specify Page Stainless Steel Electrodes.***

ACCO
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE
PAGE WELDING ELECTRODES

West Central Distributors Hold Fifth Annual Meeting

AROUND 40 welding distributors and manufacturing associates of the west central zone of the National Welding Supply Association met Nov. 1 at the Hotel Fontenelle, Omaha, to thresh out their mutual problems.

The meeting was called to order by Chairman Bob Rogers, of R and R Welding Supply Co., Des Moines, Ia. Two other "Bobs" sat with him at the speakers' table—Robert C. Fernley, secretary-treasurer, and Robert S. McCracken, Jr., national president of NWSA.

Secretary Fernley discussed current services of the association, including a composite overhead expense report and a decalcomania of the association emblem, which members can use to decorate their store doors, trucks, etc. Requests for the latter have been "tremendous," the secretary said. A revised membership directory is now being compiled. Other services being offered by NWSA headquarters are prompt reports on all NPA and OPS regulations affecting the welding industry, a collection bureau and a clearing house bulletin for the disposal of surplus supplies and equipment.

One of the first items on the program was a roundtable review of general business conditions. The consensus of opinion was that business is good, though perhaps somewhat spotty in predominantly agricultural areas.

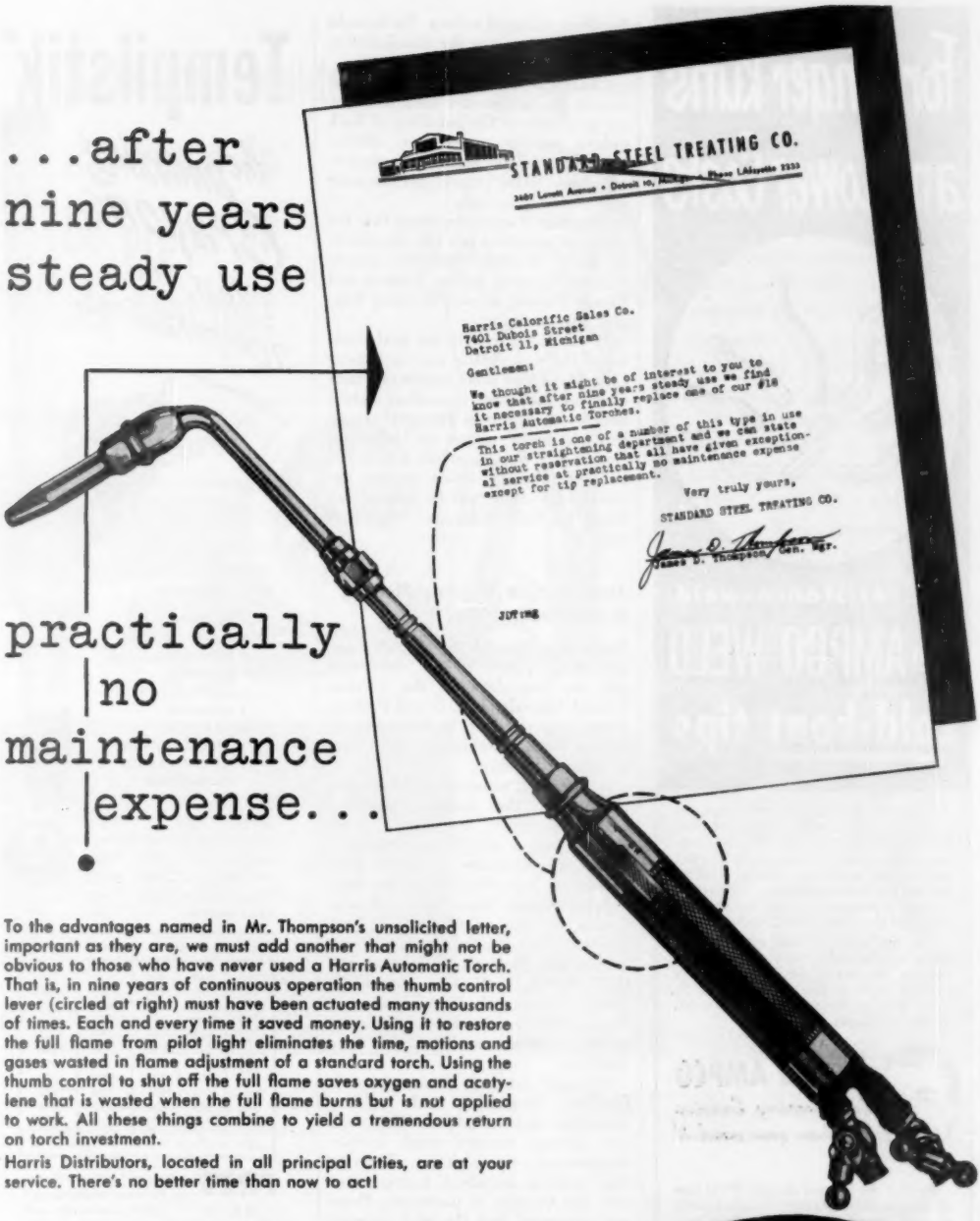
William A. Mars, sales manager, of W. P. & R. S. Mars Co., Duluth, had some interesting thoughts on the question of whether or not to set quotas for salesmen. Mars favored the quota system, but held that it is valueless unless accompanied by sound planning and accurate forecasting.

After a group luncheon at the hotel, the meeting resumed in the afternoon. The first topic, the importance of keeping abreast of new developments in the industry, was introduced by Allen H. Young, president, of Independent Distributing Co., St. Joseph, Mo. Young thought that manufacturers could do a better job of keeping distributors informed of their new developments. He also said that distributors could benefit by studying their trade publications to see what new products are being offered.

M. A. Green, Northwest Oxy-Acetylene Distributor Co., Wichita, Kansas, told the methods he uses to select, hire and train salesmen. It takes four or five years to really develop a salesman, said Green.

Marcel L. Lampton, Lampton Welding Supply Co., Wichita, discussed the

...after nine years steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #1s Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically no maintenance expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

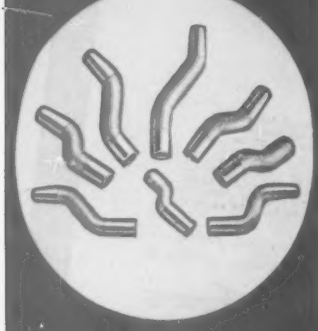
THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

For Longer Runs and Lower Costs



. . . resistance-weld with AMPCO WELD cold-bent tips

Ampco Weld cold-bent offset tips are made without patterns or special dies. Cold bending retains all physical properties too. Moreover, because holes bend with metal, there's no special drilling needed for water passages. That's why you get prompt service and fast delivery when you use Ampco Weld cold-bent tips.

But that's not all you get. You get longer runs and lower costs too — because the water passage gives you cooling right to the welding face. So, place your order today and enjoy all these advantages.

. . . and AMPCO Engineering Service when you need it

Behind the famous Ampco Weld line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Just get in touch with us.

AMPCO METAL, INC.
AMPCO
Dept. WB-12
MILWAUKEE 46, WISCONSIN
It's Production-Wise to Ampco-ize
RW-2

handling of small orders. He thought that it does not pay the distributor to invoice orders under $1.

Chairman Rogers led a general roundtable to consider such distributor problems as the handling of back orders, catalog preparation, invoicing, sales records, stock arrangement, telephone sales, truck maintenance and office equipment.

Secretary Fernley revealed that the zone had acquired two new members: I. Boyd Rundell, Rundell-Lightner Welding Supply, Salina, Kansas, and Ernest Horessi, Brown Welding Supply, also of Salina.

It was voted to hold the next meeting of the west central zone in Kansas City, Mo. Other zone meetings scheduled for the more immediate future are: Southeastern as Birmingham on Dec. 4, Southwestern at Dallas on Dec. 7, and Western at San Francisco, Feb. 7-8. The association's annual national convention will be held at the Hotel La Salle, Chicago, May 5, 6 and 7.

* * *

Aircraft Spot Welding Meeting Held at Dallas, Tex.

DELEGATES from all the aircraft manufacturing plants in the southwest met for two days at the Chance Vought Aircraft plant, Grand Prairie, Texas (near Dallas), in September to discuss the spot welding of aluminum in aircraft building.

Well known resistance welding men present at the meeting included George N. Sieger, president of SMS Corp., Detroit, and Julius Heuschkel of the Westinghouse Research Laboratory at East Pittsburgh, Pa. Spot welding experts from Boeing, Beech, Cessna, Benson, Convair (of Fort Worth), Douglas (of Tulsa), Intercontinental, McDonnell, John Deere, O. A. Sutton, U. S. Air Force, Kelly Field, Bureau of Aeronautics and Temco were in attendance. About 50 people attended each of the four meetings.

First-day meetings discussed specifications, inspection and welding schedules and techniques. The next two sessions covered work surface preparation, tip pick-up, electrode tips, welding machines, instrumentation and training of personnel. Hope was expressed that the high interest displayed in this get-together would result in future meetings of the same sort. A condensed brochure of the proceedings is being prepared. The meeting was sponsored by the Dallas section of the American Welding Society, J. J. Brown, general chairman, and Chance Vought Aircraft acted as co-sponsor and host.

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
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- FORGING
- CASTING
- MOLDING
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- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple: Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
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150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000

Also available in pellet or liquid form

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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New York 11, N. Y.

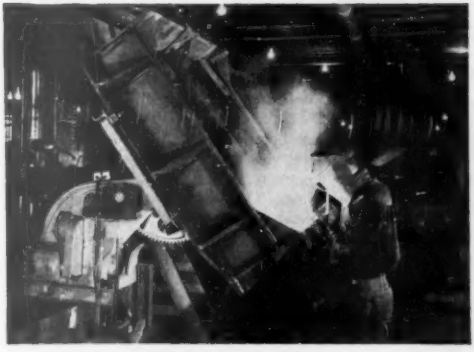
Give your welder a chance to be proud of his footage!

It's *waste welding time* when welders have to climb over, prop up or flop the work piece to get at the different seams.

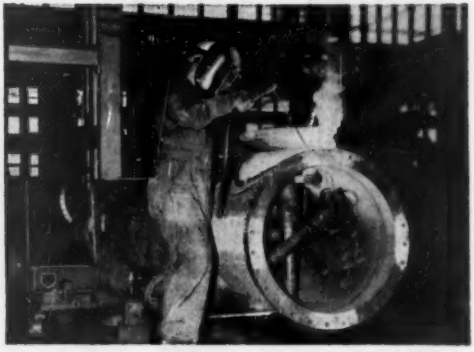
It's *all arc-time* when Worthington-Ransome Turning Rolls and Welding Positioners are used. All welds can be tilted or turned into position—without delay—for continuous downhand welding.

Result—up to 50% more footage, *better* welds (using higher current and heavier rods), less welding rod waste.

Write Worthington Pump and Machinery Corporation, Dunellen, New Jersey, for bulletins or additional information.

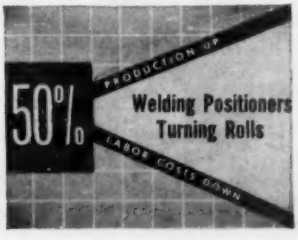


With one set-up, work piece may be tilted and rotated for either automatic or manual welding. Welding Positioner capacities from 100 lb to 30 tons.



Production goes up on manual or automatic welding, whether repetitive or job work. Turning Rolls from 3 to 150 tons, stationary or self-propelled.

WORTHINGTON



MODEL AEA-200-L
(with 3KW 110/220 volt power supply)

MILLER offers you both:

- **Model AEA 200-L Engine Driven welder and power plant**
- **Model 88 heavy duty industrial AC welder**

Low initial cost...low operating cost and low maintenance cost are features you should check now of the MILLER AEA 200-L—an engine driven welder that is also an emergency power plant that can easily be taken to the job...it weighs only 435 lbs....delivers a full 200 amperes...weatherproof construction...will handle AC or AC-DC electrodes from 1/16" to 5/16" inclusive. Powered by famous Onan 2-cylinder, 4-cycle air-cooled engine directly coupled to generator for increased efficiency. Quickly changed from welding to power service—and very effective for thawing frozen iron water pipes.

miller MODEL 88 INDUSTRIAL WELDER

Here is a welder that is ideal for all general welding applications...designed especially for production and maintenance welding, it is a heavy duty welder...carries full Underwriters' Laboratory approval... extremely compact, ruggedly constructed and simple to operate... welding current range 20-300 amperes, continuous stepless current control is provided through easy operating crank on top... current setting shown on plainly visible indicator on front panel...operates on 220 volt 50/60 cycle AC lines — dual voltage for slight additional cost...power factor correction factory installed.

Why not get the complete story on these two quality MILLER welders? Write for it now—and the name of your nearest MILLER distributor.

ARC SPOT miller WELDERS SINCE 1929

miller ELECTRIC MANUFACTURING CO.

APPLETON WISCONSIN

CONTRAST in dog scenes shows the stark truth on eye protection

New Eye Safety Poster Makes You Think

A STRIKING new eye safety poster has a simple message and two pictures. One scene shows a hunter with his dog; the other, a blind man with his dog. A headline asks, "Which Dog Would You Rather Follow?" The poster is printed in two colors and is 12 in. wide by 10 in. deep. Copies may be obtained free from Willson Products, Inc., Reading, Pa.

* * *

Missouri Man Wins Sellstrom Birthday Gift

J. J. DILLON of the Myers Motor Co., Joplin, Mo. won the October Sellstrom Manufacturing Co. birthday gift, a fine floor lamp. The October drawing was made by Paul Lljigren, Welding Metals Mfg. Co., Detroit, on his birthday.

During the past year Sellstrom has gathered information on the birthdays of most of its dealers in the country so that it can hold such drawings. Once a month, the birthday cards for that month are taken to a dealer who has his birthday that month. He draws the winner, who receives the gift.

* * *

Welded Tank Hulls Save Lives in Korea

ONE of the most successful developments in American fighting tanks has been the use of welded armor plate for the hulls. Reports from Korea say that very few failures of welded armor have occurred other than by direct enemy hits.

Even the belly of the tank, usually the most vulnerable, nearly always holds up in battle, our soldiers have found. Land mines have occasionally twisted the armor so that plates had to be replaced but the seams did not rupture. Another advantage of welded hulls is their rounded contour—enemy shells are more likely to ricochet off without piercing the side.

HIDDEN STRENGTH

in trained hands

. . . there's more than meets the eye in Alloy Rods are welding electrodes

NO WELDING ROD is better than the skill of the welder using it . . . but any skilled welder can get consistent *quality* welds, faster and cheaper, using *Alloy Rods'* seven complete lines.

Principal reasons: *Alloy Rods'* continuous *quality control*—continually producing identical characteristics in each grade of electrode from every production run . . . continuous on-the-line testing and inspection . . . the continuous efficiency and exclusive production techniques of the world's most modern electrode manufacturing plant, *producing arc welding electrodes only.*

Although our Distributors may temporarily be out of stock on certain types, we urge you to keep in touch with them on your requirements. After all, *quality* is always worth waiting for.

NAMES TO REMEMBER IN ARC WELDING

ARCALOY for stainless steel
ARMORARC for armor welding
BRONZE-ARC for bronze and cast iron
NICKEL-ARC for cast iron
TOOL-ARC for tool steel
WEAR-ARC for hard-facing
WELD-ARC for low hydrogen electrodes

Contact your Alloy Rods Distributor or write for specific product Bulletins.

AR-4

ALLOY RODS COMPANY

No Finer Electrodes Made . . . Anywhere

YORK, PENNSYLVANIA

Robotron EXPANDS AGAIN...TO MEET INDUSTRY'S EVER-GROWING DEMANDS!

From a simple 3B Weld Timer in 1948 to a complete line of **Synchronous and Non-Synchronous Electronic Welding and machinery controls** in 1951 . . . Robotron has tried to grow *with* industrial needs. To succeed these controls had to help increase productivity, quality control and general operating efficiency. These controls had to be created, tested and proven *before* they were accepted. It was features like: Quick interchangeable control panels, simplified circuits, husky industrial designs, unit construction (for easy accessibility), compactness, dependable performance and a minimum of maintenance that put **Robotron Electronic Controls** across. And repeat orders from all major industrial plants proves these features are more popular than ever.

The new, large, modern plant shown above, is our third expansion within 3½ years. More evidence that Robotron *is* meeting industry's growing demands. This building and the investment it will represent in equipment and the time of men of specialized skills—is a symbol of our faith in the future of our company, our industry and our country.

Let Robotron show you how better control of your industrial production energy will result in *more and better products at less cost!* No obligation of course.

FREE! Ask for NEW Robotron "Catalog of Non Synchronous Timers" and "Why Robotron" booklet.

THE FINEST IN INDUSTRIAL ELECTRONICS

Robotron* CORP.

21300 W. Eight Mile Rd., Detroit 19, Mich.

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Barbecue and Dance Mark Big Three Welding Opening

RADIO speeches, a barbecue for 2,000 and a big dance attended the formal opening of the new Big Three Welding Equipment Co. plant in Houston, Tex., on Oct. 17. Most prominent guest at the opening was James F. Lincoln, president of The Lincoln Electric Company, who made the radio speech.

The new plant is at 3602 West Eleventh St., on an eight acre tract. It has special facilities for repairing, storing and merchandising every type of arc and gas welding equipment.

The business was started in 1920 by C. K. Rickel and B. K. Smith. Mr. Smith died three years ago, but Mr. Rickel is president of Big Three and general manager of the Fort Worth division. Mr. Smith's three sons, Harry K., a Big Three vice-president; A. Smith, general manager of the Big Three's Smithweld Company and Dr. J. K. Smith, a Houston dentist, are active in the welding business.

Subsidiary companies of the Big Three organization are the Houston Oxygen Co. organized in 1935 and the Smithweld Company. Main offices of the company are at Houston and Fort Worth, with branch offices at Tulsa, Oklahoma City, Corpus Christi, San Antonio, El Paso, Kilgore, Orange, Beaumont, Port Arthur, Odessa, Lubbock, Borger, Longview, Dallas and Brownsville, Texas.

* * *

Welded Pipe Capacity Rises 153% in Three Years

GREATLY increased use of pipeline products such as oil, gas and other fluids has been reflected in a 43% increase in the capacity for making steel pipe and tubing in the last three years, says the American Iron and Steel Institute.

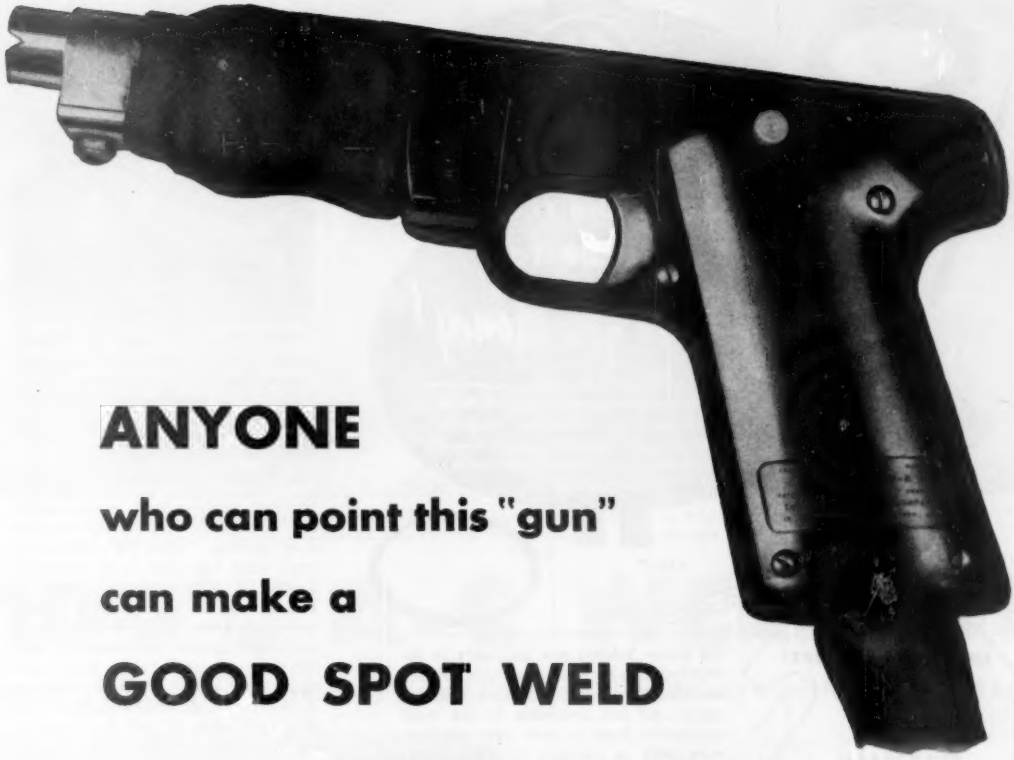
Welded steel pipe capacity is five times higher than prewar and in the last three years has jumped 153%. Annual welded pipe capacity was 5,128,000 net tons on Jan. 1, 1951.

Entire pipe making facilities of the country turn out 12.5 million tons of pipe per year. It is estimated that oil and gas lines in the ground early this year contained 60 million tons of steel pipe.

* * *

New Erico Distributor

ERICO Products, Inc., Cleveland 3, O., has appointed Howard H. Loving, 5462 West Division St., Chicago 51, as its "Cadweld" electrical connection representative in the Chicago area.



ANYONE

who can point this "gun"

can make a

GOOD SPOT WELD

"HELIARC" HW-8 Pistol-Grip Torch needs no forging pressure...works from one side of sheet... spot welds both STAINLESS and CARBON STEELS

Are you using light gage metals to fabricate large assemblies or irregular shapes? If so, chances are you can simplify many of your joining problems, boost production, and cut costs, too, by spot welding with the HELIARC HW-8 Torch.

The HW-8 joins mild steel, low alloy, or stainless steel .020 to .064 in. thick at one to two seconds per weld. Because it works *from one side of the sheet*, without forging pressure, it makes an easy, one-hand job of spot welding — even in places where resistance welding is not practical or possible.

Connected to a suitable power source with auxiliary timer, the HELIARC Spot Welding Torch makes inert gas shielded welds without fumes, smoke, or spatter. Since operation is automatically controlled, workmen on the assembly line need only press the "muzzle" of the "gun" against the work and pull the trigger. A single hose assembly permits free use of the torch over a 25-ft. radius.

For further information, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

The term "Heliarc" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, and FORMING METALS

SILVER BRAZING
ALLOYS and FLUX
TEAM UP TO
Save You Money!

More and more cost-conscious manufacturers are specifying GB Silver Solder and GB Flux! They have found that these two products, developed to work together, give them the best results on their low temperature brazing operations.

GB HELPS YOU CONTROL THESE COST FACTORS!

SPEED
HEATING
MATERIAL
LABOR
CLEANING
FIT-UP
PREPARATION

GB Silver Solders are available in six standard alloys—each developed to meet specific cost and production requirements. All are available in the most convenient form to meet your needs—wire coils or straight lengths, strips, sheets or formed pieces.

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance—their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

GB FLUXES

Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

GB DATA BOOK

Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor—Write us and a copy will be forwarded to you.

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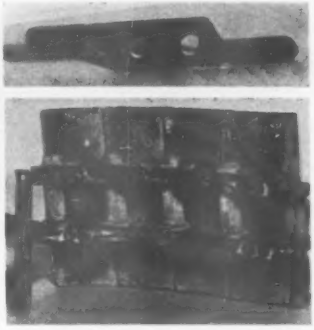


WELD-ON plate (top) for Caterpillar tractor links saves welding when wear is too far advanced for economical hard-facing investment

New Weld-On Plates for Crawler Tractors

NEWEST welding kink recommended for "Caterpillar" D7 and D8 tractors is a "weld-on" plate for resurfacing track links that have been worn too deeply for successful weld overlays. The new plates will resurface links worn in excess of ⅜ in. They are made of hardened and tempered steel and are estimated to be more economical than an equivalent thickness of overlay. "Cat" tractor dealers now offer such parts as does the Caterpillar Tractor Co., Peoria 8, Ill.

• • •

Worthington Pumps Power World's Largest Presses

THE largest presses in the world, specially built to make die forgings for airplane parts, are hydraulically powered by triplex pumps manufactured by Worthington Pump and Machinery Corp., Harrison, N. J. One of the presses, a 75,000 ton monster, is at the Wyman-Gordon plant at North Grafton, Mass. The other, of 25,000 tons capacity, is an extrusion press in an Air Force installation at Adrian, Mich.

• • •

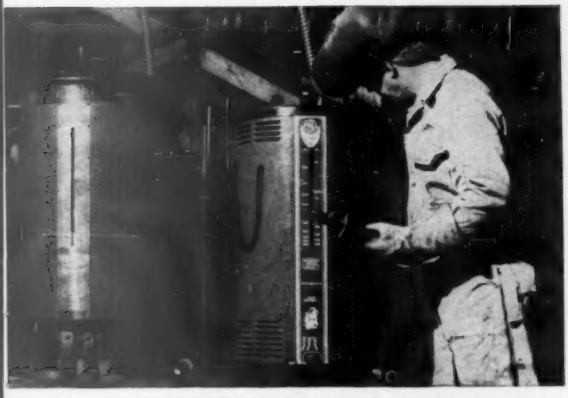
New Federal Taxes Slice Allis-Chalmers Earnings

BECAUSE of increased federal tax rates, the Allis-Chalmers Manufacturing Co., Milwaukee, had to set aside $27,650,000 for income and excess profits taxes for the first nine months of 1951, an increase of 95% over the same period in 1950. Billings for the company for the first nine months of this year were 27% higher than for the same period a year ago, however, and earnings before taxes were 36% over the same period last year.

Here, Alco welders help meet production schedules on locomotive frames, vital to defense, by using G-E a-c welders. AC welders eliminate troublesome arc-blow encountered when welding high-tensile steels with d-c equipment.

100% A-C WELDED!

Here's How Alco Produces Road Locomotive Frames with G-E Welders



Shown above are two of the many G-E a-c welders used at Alco.

Corners can be difficult to weld, but the absence of troublesome arc-blow with G-E a-c welders enables this operator to lay an even corner bead in any position.

Diesel-electric road locomotive frames are 100% a-c welded at the Schenectady, N. Y., plant of American Locomotive Company. Alco welding engineers report that General Electric a-c welders eliminate troublesome arc-blow, make for easy striking, cost less than d-c, use less power and are easily maintained.

Like the American Locomotive Company, you may also find that you can speed production by using G-E a-c welders. For example . . .

YOU CAN WELD BETTER WITH AC

You have complete control of the arc in all positions because G-E a-c welders eliminate troublesome arc-blow. This reduces the danger of undercutting and slag inclusions and produces better welds.

YOU CAN WELD FASTER WITH AC

In almost every case you can use higher currents and larger electrodes. That means more footage. Users report increases of 10 to 50%.

YOU CAN WELD AT LOWER COST WITH AC

G-E a-c welders cost less than d-c equipment of the same rating. They use only one-fourth as much power when idling and have much lower load losses. And because there are no rotating parts, maintenance is practically negligible.

SEE YOUR G-E WELDING DISTRIBUTOR!

He's listed in the yellow pages of the telephone directory. Just look for General Electric under "Welding Equipment." Your distributor carries a complete line of welders, accessories and electrodes. General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

711-17

REGO*
TWO-STAGE
REGULATOR
3070R
OXYGEN
Precision Regulation for
OXYGEN • ACETYLENE • HYDROGEN
The precision performance of a two-stage RegO Regulator is especially desirable for piped distribution systems and other applications where large volumes of high pressure gases must be controlled accurately.
Two-Stage Regulation Gives You Plus Performance!
Constant delivery pressure regardless of drop in pressure at the inlet . . . Patented design incorporates nozzle-type first stage counterbalanced by stem-type second stage . . . Triple action cartridge filter eliminates troubles usually caused by rust, dust or dirt.
Listed by Underwriters' Laboratories, Inc., and Factory Mutual.
The BASTIAN-BLESSING Company
4201 West Peterson Ave. Chicago 30, Illinois
REGO
PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES
*Reg. U. S. Pat. Off.

To Study Welding Maintenance at January Maintenance Show

INTENSIVE examination of maintenance problems will be the big quest at the third Plant Maintenance Conference at Philadelphia's Convention Hall, Jan. 14-17. The six conferences will cover such general topics as costs, inspection methods, records, planning and scheduling, training workers and lubrication.

Welding, safety, housekeeping, power plants, training men, planning, etc., will be the subjects of special roundtable studies. Separate sessions are assigned for the electrical, chemical, construction, metal-working, aircraft, food, glass, oil and textile industries.

Four conferences will discuss the small plant, in groupings of 1-10 maintenance employees, 11-50, 51-100 and 100-300 employees. During the conference, more than 200 companies will display maintenance products and services.

* * *

Burdett Oxygen Enlarges California Branch

SEVERAL thousand square feet of floor space have been added to the Burdett Oxygen Company of Cleveland plant at Huntington Park, Calif. In addition, air-conditioned offices were constructed for the larger number of sales and office workers. An open house for Burdett customers was held Oct. 26.

Besides new equipment for producing industrial gases, special facilities have been added to demonstrate the latest welding procedures. The Burdett plant at Huntington Park was established in 1947 because of the fast expansion of the Los Angeles industrial potential.

E. J. Morse, executive vice-president, welcomed the guests along with Jack Bernstein, general manager of the plant and Pat Zeedik, local sales manager.

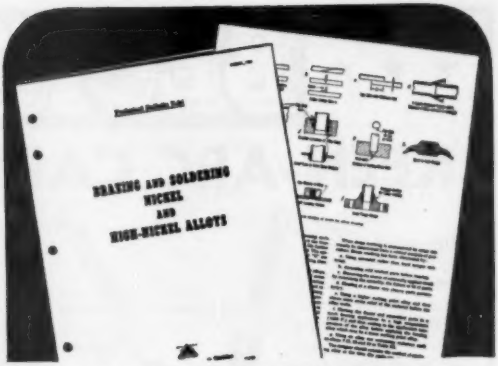
* * *

Norton Company Forms Overseas Operating Division

FORMATION of a new company to be known as Norton Behr-Manning Overseas, Inc., was announced recently by Norton Co., Worcester, Mass., and Behr-Manning Corp., Troy, N. Y. The new firm will handle all the export business and direct the subsidiary plant operations of these two corporations throughout the world. Headquarters will be in Worcester with branch office located in New Rochelle, N. Y. and New York City.

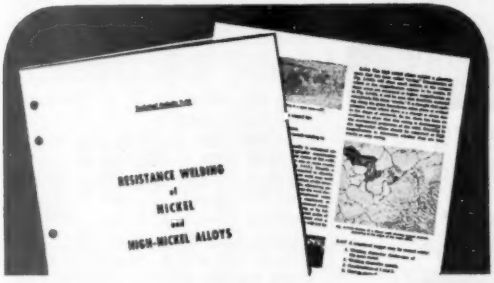
Now you can have a *Complete Library*

on welding Nickel and High-Nickel Alloys



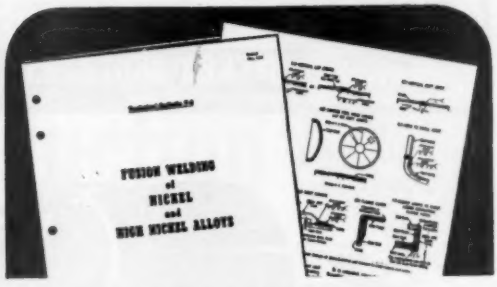
T-34, "Brazing and Soldering Nickel and High-Nickel Alloys"

This is the newest welding publication from Inco's Technical Service Section. It covers design, surface preparation, fluxes, heating methods, post brazing treatment and inspection for silver and copper brazing. It also contains valuable tables on properties and formulae and a section on soft soldering.



T-33, "Resistance Welding of Nickel and High-Nickel Alloys"

T-33 covers design and equipment considerations, welding procedures (both for similar and dissimilar metals), checks for defects and tests for spot, seam, projection and flash welding. It also covers resistance brazing. It gives tables on chemical analysis and mechanical and physical properties, and recommended conditions for welding. The text is amply illustrated with valuable diagrams and photographs.



T-2, "Fusion Welding of Nickel and High-Nickel Alloys"

T-2 covers surface preparation, joint designs, jigs and clamps, electrodes, current, pre-heating, flux and welding procedures for metal arc and gas arc welding. It discusses overlays on cast iron and joining of dissimilar metals; and the preparation, application and testing of linings. It contains tables of chemical analysis and mechanical and physical properties and electrode requirements. Like T-34 and T-33, it is heavily illustrated with diagrams and photographs.

Inco's Technical Service Section wants you to have all three of these bulletins to complete your library on the most up-to-date welding techniques. There is no charge for them. Write today for T-34 and if you don't have T-33 and T-2 ask for them, too.

Remember, Inco Welding Materials take longer to get because so much is being diverted to defense. But, Inco's Technical Service Section is always ready to help on your special welding problems.

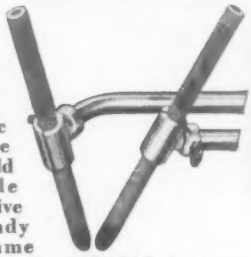
EMBLEM OF SERVICE INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

★ ★ ★ BECKER

KEEN-ARC CARBONS



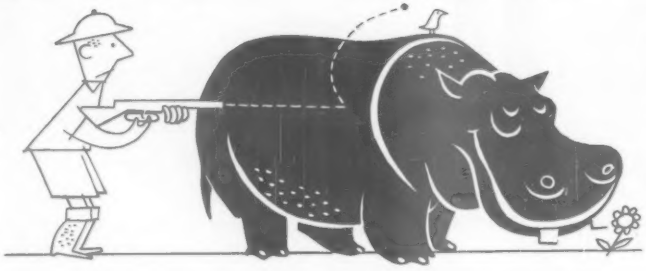
FOR CONSISTENTLY GOOD RESULTS

Designed to carry the high currents necessary for intense heat, BBB Keen-Arc Carbons produce a fine-grained weld of high tensile strength. They give a smooth, steady "flowing" flame which does not wander and which is concentrated at the desired focal point. Flame temperature is easily and accurately adjusted by merely changing the ampere input, and heavy copper coating permits gripping at extreme ends—eliminates frequent and periodic resetting.

A COMPLETE LINE OF CARBON WELDING SUPPLIES including carbon and graphite electrodes, carbon rods and plates, welding paste, etc.

Write for catalog.

BECKER BROTHERS CARBON CO.
3450 South 52nd Ave. Cicero 50, Illinois



BB's CAN'T PENETRATE HIPPO HIDE!

—and weld spatter can't penetrate P.O.M. When you apply P.O.M. No. 2 to weld seam and adjacent metal you get better, cleaner welds and all spatter wipes off with a dry rag! Protect-O-Metal does not cause smoke or fumes, goes on in a hurry, saves as much as 85% of weld cleaning time and labor. Use P.O.M. No. 8 for rust prevention as well as spatter protection. Order trial gallons of both No. 2 and No. 8. Satisfaction guaranteed or we'll cancel the invoice.

PROTECT-O-METAL
POM
GWSMITH

G. W. SMITH & SONS, INC. 5408 KEMP ROAD, DAYTON, O.

Detroit NWSA Meeting Attracts 111 Delegates

THE central zone meeting of the National Welding Supply Association held Oct. 19, at the Fort Shelby Hotel in Detroit, attracted more than 111 distributors and manufacturers. Presiding over the meeting was Ray P. Tarbell, president of Scott-Tarbell, Inc., Cleveland.

Nine new companies signed membership applications during the meeting. They were American Welding Supply and Engineering Co., Detroit; Central Welding Supply Inc., Lansing, Mich.; Detroit Gas Products Co., Royal Oak, Mich.; Dinsmore & Co., Montreal, Canada; Miller Equipment Co., Cincinnati; The J. L. Oswald Co., Detroit; Smith Welding Supply & Equipment Co., Detroit; H. R. Toll Co., Minneapolis, Minn.; Welding Metals Mfg. Co., Detroit.

Values of membership in NWSA and the association aims and purposes were discussed by president R. S. McCracken, Jr., R. S. McCracken & Sons, Inc., Philadelphia, in the general session. J. M. Robinson, president, Robinson Welding Supply Co., Detroit, gave the assemblage his opinions on successful methods in selecting, hiring and training salesmen.

In the afternoon, R. A. Fibelkorn, RAF Advertising Inc., New York City, gave members an interesting talk on effective sales promotion. Gas cylinder control and demurrage billings were the subjects of a talk by Robert Jackson, president, Jackson Welding Supply Co., Inc., Rochester, N.Y. How to best utilize direct-mail advertising was the message given by I. R. Silver, secretary, Chicago Welding Sales Co., Chicago. Final discussion of the afternoon was by R. Dudley Layman, president, Layman Welding Supply Co., Grand Rapids, Mich., who talked on the importance of keeping up with new developments in welding.

• • •

High School Weldor's Work Pictured in Booklet

To announce the new Farm Welding Award Program for High Schools, the James F. Lincoln Arc Welding Foundation has an illustrated booklet showing more than 50 farm shop projects. The program puts up $7,000 in awards this year, $5,000 in cash prizes to students and $2,000 to high schools enrolling the main winners.

Projects shown in the booklet are those which won prizes in last year's contest. Full contest rules are included in the booklet, which can be obtained free from the Lincoln Arc Welding Foundation, Cleveland 17, O.

Take advantage of exclusive P&H AC Dial-lectric principle

give your production a lift

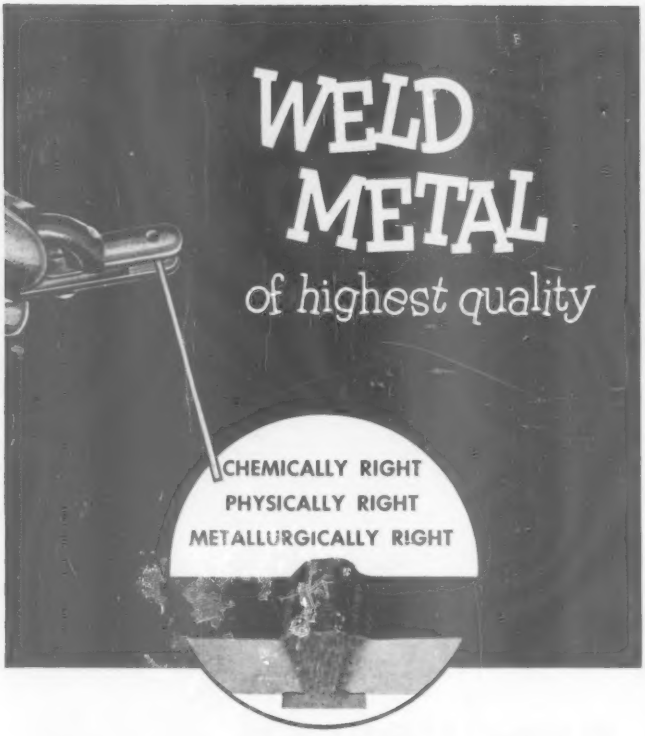
— with safe, open-circuit voltage . . . easy, quick-start arc . . . time-saving, built-in remote control . . . compact AC design

Armor plate welding calls for low-hydrogen or stainless steel electrodes. P&H, pioneer in the low-hydrogen field, also offers the AC welder that gives you the best weldability with these rods — for greater production.

Your men like the P&H AC Dial-lectric — like its safety under the most adverse conditions; like the easy, quick-start arc, the elimination of arc-blow. And they get more done! Get sounder, better looking welds in less time, thanks to built-in remote control which lets them select the right heat at the work, turns *walking time* into *welding time.*

Because these welders give production such a lift, P&H has stepped up its delivery schedules to meet defense demands without delay. Get your production rolling in high gear. Order your P&H AC Welders today. Capacities up to 650 amps. Take advantage of this delivery situation while it lasts.

P&H WELDING DIVISION
4513 W. National • Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION



ARCOS Quality Controls on Stainless Electrodes assure you all three!

When you put Arcos Chromend or Stainlend Stainless Electrodes to work on a critical welding job, you want to be sure of consistent, dependable results. That's why every Arcos Stainless Electrode is tested and retested throughout its manufacture. Before it ever reaches your hands it must meet the most critical specifications in the electrode industry. It's your assurance of better weld metal . . . improved welding performance . . . lower weld costs.

ARCOS CORPORATION
1500 S. 50th Street, Philadelphia 43, Pa.

WELD WITH ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

Photo Courtesy The Lincoln Electric Co.

JAPANESE STAMP honors the arc welding process, shown here being used to repair a railroad locomotive. This 500 yen stamp is worth about $1.35, so take a good look.

Welding of Steel Castings Explained in New Booklet

A comprehensive new manual on the welding of steel castings contains practical data on the subject based on exhaustive studies made by the Steel Founders' Society, member companies and research engineers. It comprises a valuable guide for steel foundries and welderies in establishing reliable welding procedures and experience-proven quality standards.

Bound in three sections, it includes detailed consideration of established procedures, tabular classification of electrodes, trade-names and manufacturers for all classes of electrodes, compositions and recommended procedures for various steels. A bibliography is included.

Copies can be obtained by writing to the Steel Founders Society, 920 Midland Building, Cleveland 15, and enclosing the cost price of 35c each.

• • •

Tool Engineers Show Set for Chicago, March 17

THE American Society of Tool Engineers Industrial Exposition will be held in Chicago, March 17-21, 1952. The largest ever staged by the ASTE, it will occupy all five halls at the International Amphitheatre there.

• • •

NWSA Meeting Dec. 4 At Birmingham, Ala.

DISTRIBUTORS and manufacturers of welding equipment will meet at the southeastern zone meeting of the National Welding Supply Association at the Bankhead Hotel, Birmingham, Ala., Tuesday, Dec. 4.

No "Welding Disease," British Doctors Find

AN INVESTIGATION by the Factory Department of the Ministry of Labor and National Service of the English Government has concluded that weldors do not suffer from any so-called "welding disease." Occupational skin irritations on some weldors did not appear to be a frequent or serious cause of disability.

As part of the investigation, every type of welding was surveyed and a clinical examination was made on some 250 weldors working in different industries. In some cases special tests such as radiological examination of the chest and blood examinations were made.

Although arc weldors may suffer from "arc eyes," this has no permanent effect. Weldors exposed to high concentrations of fume experience slight irritation of the throat but no serious effects were observed. Exposure to welding fumes does not predispose the weldor to pulmonary tuberculosis. Stomach troubles are no higher in weldors than in the general population, rheumatism is not excessive, there is no evidence of ill effects on blood pressure or the nervous system and where there is good or moderately good ventilation there is little danger of gassing during welding.

Results of the survey have been published in a book titled, *The Health of Weldors.*

—McGraw-Hill World News

* * *

Sheet and Strip Capacity Boosted 30% since 1948

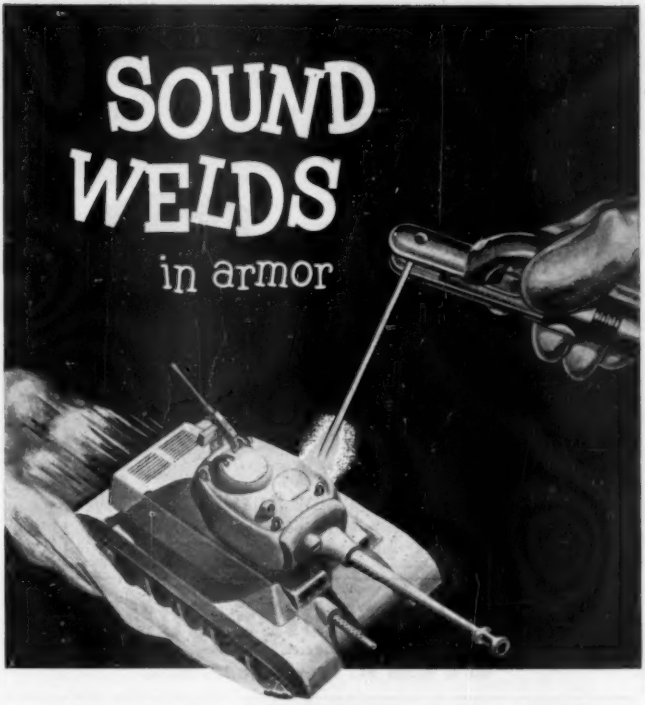
TOTAL HOT-ROLLED sheet and strip capacity of steel companies in the United States has increased almost 30% in the years from 1948 to 1951, according to data recently assembled by the American Iron and Steel Institute. Cold-rolled sheet and strip capacity is up more than 25% and electrolytic tin plate capacity 49%.

Reflecting the great demand for pipe for natural gas transmission lines, the total capacity for all types of pipes and tubes increased 43%. The capacity for making "electric weld" (seam welded) tubing increased 153%.

* * *

Dallas Meeting For NWSA, Friday, Dec. 7

THE southwestern zone meeting of the National Welding Supply Association will be held Friday, Dec. 7, at the Hotel Adolphus in Dallas, Tex. The states of Arkansas, Louisiana, New Mexico, Oklahoma and Texas are in this zone of the association.



Use ARCOS Low Hydrogen Electrodes • Save Critical Alloys

ARCOS LOW HYDROGEN ELECTRODES
Tensilend 70
Tensilend 100
Tensilend 120
Manganend 1M
Manganend 2M
Nickend 2
Chromend 1M
Chromend 2M

There's nothing experimental about welding high tensile steels with Arcos Low Hydrogen Electrodes. They've all been tested by time and service on armor welding as well as commercial applications. Since original development in 1942 the Arcos "family" of Low Hydrogen Electrodes has grown to be one of the most complete.

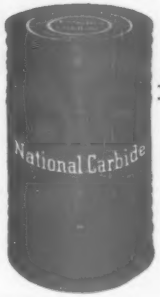
Every time you use low hydrogen electrodes in place of stainless on welding high tensile steels, you'll be conserving many of the critical alloys so vitally needed today.

ARCOS CORPORATION • 1500 South 50th St., Philadelphia 43, Penna.

WELD WITH

ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

National
Carbide
EFFICIENT
ECONOMICAL
DEPENDABLE
for
Welding & Cutting
SPECIFY


NATIONAL CARBIDE IN THE RED DRUM
Write us for information as to nearest available stock.
NATIONAL CARBIDE COMPANY
A Division of Air Reduction Company, Inc.
60 E. 42nd St., New York 17, N. Y.

Tippy Says: ST. GEORGE FROM THE DRAGON HAD NOTHING TO FEAR FOR HIS ARMOUR WAS WELDED, YOU CAN BE SURE!
You will have nothing to fear if you use GOOD welding electrodes!
The finest Resistance Welding Electrodes available are . . . TIPALOY! . . . they are fabricated to wear and wear . . . give you longer life, less redressing, less mushrooming and cut production costs. You have used ordinary welding electrodes long enough . . . switch to TIPALOY Resistance Welding Electrodes today!

Tippy Says: . . . Take a tip, try TIPALOY!
Write today for test samples and "the story of STRAIGHT LINE conductivity!"
Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN
No. 7 of a Series
Branches in All Principal Cities

About People

WILLIAM IRRGANG was elected executive vice-president of The Lincoln Electric Co. at a recent board meeting. With Lincoln since 1929, he has developed manufacturing methods and machinery for reducing the cost of welding electrodes. He has been director of plant engineering for six years and as such supervised the improved methods to be used in Lincoln's new plant.

• • •

J. P. COUGHLIN, manager of field sales of the welding division, Westinghouse Electric Corp., Buffalo, N. Y., announces the following changes in the arc welding department: M. W. BREWSTER, Philadelphia supervisor has been transferred to Buffalo to be in charge of product coordination in arc welding customers' service. He will be replaced in Philadelphia by LOUIS HAUSER who will be supervisor of the middle Atlantic district, having been transferred from central district headquarters. Mr. Hauser is a Westinghouse scholarship graduate, and has worked for the company in St. Louis, Philadelphia, Cincinnati and Cleveland. WALTER BARNES becomes the Westinghouse arc welding representative in Newark, N. J. He was previously with Handy & Harman and Charles W. Kreig Co. at Newark. He replaces JIM BLAHM who is becoming a welding distributor in the Asbury Park, Brunswick, N. J. area.

• • •

ROBERT T. BROWN has been named district manager for Metal & Thermit Corp., in Pittsburgh where he fills a vacancy left by the resignation of O. T. Barnett. NICHOLAS KIERNAN, with M&T 13 years has been appointed district manager at Newark, N. J.

• • •

P. F. LAVEDAN has been elected chairman of the board, a new office, of The Liquid Carbonic Corp., Chicago, and will also remain as chief executive officer of the company. W. A. BROWN, JR., becomes president and general manager. K. P. MILLER, in charge of machinery sales and J. P. WRIGHT, manufacturing executive, were elected vice-presidents.

BERNARD C. TRACEY, manager of accessories and renewal parts sales of General Electric's welding department, retired on Nov. 1 after nearly 34 years of service to the welding industry. He joined GE in 1918 to work on standardizing welding methods. He was one of the originators and a charter member of the AWS in New York, served on many AWS committees and was chairman of the Northern New York section.

* * *

HARRY W. PIERCE, president of the American Welding Society, has been elected to vice-president in charge of design and procurement at New York Shipbuilding Corp., Camden, N. J.

* * *

JOSEPH EMERY EDENS has been appointed a member of the sales department of Lebanon Steel Foundry, Lebanon, Pa.

* * *

VERN W. PALEN will handle technical publicity for the research and control instruments division, North American Philips Company, Inc. In order to resume his connection with Philips, Palen has resigned his position with Michel-Cather, Inc., where during the past three years he had served a number of publicity clients. His office with Philips is at 750 South Fulton Avenue, Mount Vernon, N. Y.

* * *

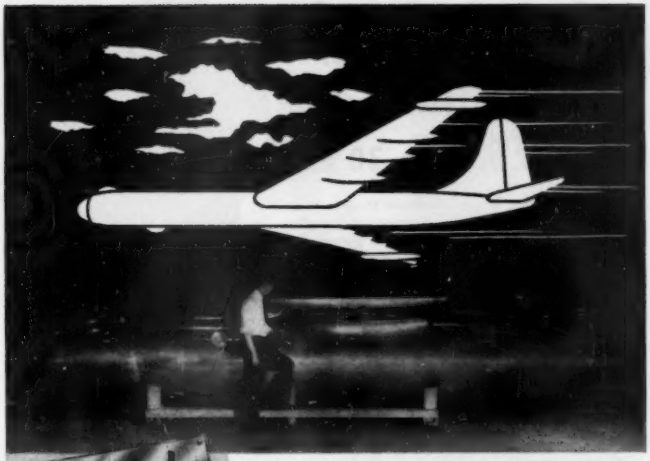
CHESTER O. BARNES has been appointed sales manager of the hoist division of Harnischfeger Corp., Milwaukee. He was formerly a sales engineer in the welder division and in 1945 became supervisor of welder dealers in the Midwest.

* * *

JULIUS H. NILL has been appointed southern regional manager, Metallizing Engineering Co., Inc., with offices at New Orleans, La. He has been with the firm since 1945 handling sales in the middle and southern Atlantic states.

* * *

BENJAMIN F. FAIRLESS, president of the United States Steel corporation received this year's Gold Medal of Merit award given annually by the Wharton School Alumni Society of the University of Pennsylvania. The award was scheduled for presentation on Nov. 12.



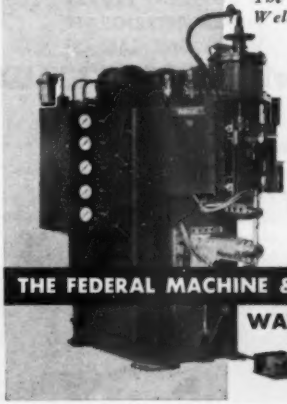
Federal RESISTANCE WELDERS USED IN CONSTRUCTION OF LARGEST KNOWN FUEL TANK

The huge external aircraft fuel tank pictured above is one of a type being produced for the Air Forces by the Ryan Aeronautical Company. Designed by Ryan the tanks are fabricated of aluminum alloys, seam welded to MIL-W-6860 (AN-W-30) on Federal Welders where Ryan is making gas-tight seams without the use of sealing compounds.

Federal Resistance Welding equipment enables Ryan to produce a smoothly streamlined tank that has no external riveting or protuberances to disturb the aerodynamic flow over the skin. Too, resistance welding the tanks eliminates added weight.

High production is another important factor and Ryan, like other aircraft and automotive manufacturers, finds Federal Resistance Welders the most efficient method for producing quality assemblies at high speeds.

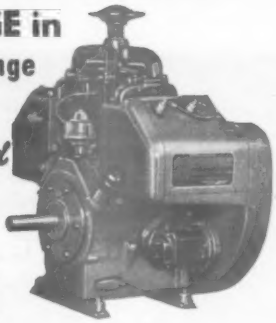
The latest Federal Three-Phase Aircraft Spot Welder for welding stainless, aluminum, nickel alloys and carbon steels. If you are interested in Three-Phase Resistance Welding be sure to talk with the Federal Representative in your area. There's a reason why Federal is First in Resistance Welding. Send for your copy of the latest Federal Three-Phase Bulletin.



THE FEDERAL MACHINE & WELDER CO.
WARREN, OHIO

Federal® WELDERS
Warco® PRESSES

POWER ADVANTAGE in the Top Bracket Power Range . . . V-Type 4-Cylinder WISCONSIN *Air-Cooled* ENGINES, 15 to 30 hp.



These 4-cylinder, V-type Wisconsin Engines meet every heavy-duty power requirement. V-type design assures not only the smoothest power delivery but also represents substantial reductions in engine weight as well as extreme compactness . . . at no sacrifice of rugged construction.

CONDENSED SPECIFICATIONS

MODELS		VE4	VF4	VP4D
Bore	inches	3	3¼	3½
Stroke	inches	3¼	3¼	4
Displ. cubic inches		91.9	107.7	154
H.P. and R.P.M. range		15 at 1600	17.5 at 1600	26.8 at 1600
		21.5 at 2400	25 at 2400	31 at 2200
Net weight in lbs., Standard Engine		295	295	410

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and the name of the nearest Wisconsin distributor.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

IMPORTANT
NEW USES
MEAN THAT YOU CAN
SAVE MONEY
WITH
3 in 1 "York's 77" SPECIAL FLUX
FOR...
GENERAL BRAZING
CAST IRON WELDING
CAST IRON BRAZING

NO NEED TO STOCK 3 DIFFERENT FLUXES WHICH DETERIORATE WHEN ONE CAN OF
"York's 77" 3 in 1 FLUX
MEETS ALL YOUR NEEDS

Make full use of the 4 famous features of "York's 77". You will save money, save labor, and save time.

1 Fear of overheating can be forgotten.
2 Cleaning and grinding are unnecessary, because "York's 77" penetrates through grease, oxides, etc.
3 Chipping is unnecessary, because a satisfactory bond can be obtained on oxidized surfaces.
4 Deteriorated cast iron can always be welded successfully with "York's 77".

YORK ENGINEERING COMPANY
3349 OGDEN AVE. • CHICAGO 23, ILL.

J. W. SPOOR has been named general sales manager of the Welding Products Division of A. O. Smith Corp., Milwaukee. L. F. VONIER, former sales manager, is moving into the new position of sales promotion manager where he will assist division manager L. T. HICKEY and Mr. Spoor in expanding welding sales. Mr. Spoor was formerly manager of A. O. Smith's product service division.

• • •

J. O. CAVANAGH has joined Alloy Rods Co., York, Pa., as technical director. He has 15 years' experience in the research and development of arc welding electrodes. An active member of AWS, he attended Illinois Institute of Technology where he obtained bachelor and master's degrees in 1932 and 1933.

• • •

R. B. KROPF has been transferred from The International Nickel Company's Cincinnati technical section to the Detroit technical section. C. T. HALLER, formerly of the Pittsburgh technical section has been placed in charge of the Cincinnati technical section.

• • •

J. B. LARAMY has been appointed manager of the marketing research department of Worthington Pump and Machinery Corp., Harrison, N. J.

• • •

FRANK ZACHER was named director of personnel of Norton Company. He will report to Ralph F. Gow, executive vice-president.

• • •

LLOYD R. JACKSON has been named an assistant director of Battelle Institute to handle research coordination. He is a member of the American Welding Society as well as the ASM, ASTM, American Physical Society and Sigma Xi.

• • •

CAL BOYLES will handle all welding sales promotion for Westinghouse Electric Corp. and will have his headquarters in Pittsburgh. He has welding experience in the various sales districts.

ARCHIE K. BEARD has been appointed Midwest sales manager of Turco Products, Inc. HAROLD P. GLAVIN has been named to the post of general manager, midwest division factory of Turco Products, with headquarters in Rockdale, Ill.

* * *

HARRY H. FAIR of San Francisco was elected chairman of the board of Caterpillar Tractor Co. at a recent meeting in San Francisco. He succeeds the late C. L. Best who died Sept. 22.

* * *

THOMAS D. JOLLY, vice-president in charge of engineering and purchases for Aluminum Company of America has been presented Carnegie Institute of Technology's Merit Award for worthy achievement.

* * *

BERT L. PIERCE has been named chief engineer of the Ewart plant of Link-Belt Co. in Indianapolis, to succeed CHARLES R. WEISS, who has retired after 42 years' service with the company. RUSSELL T. SWEENEY has been appointed assistant chief engineer.

* * *

Died . . .

HENRY H. ERKELENZ, 72, retired vice-president and member of the executive committee of Harnischfeger, Corp., Milwaukee, died Oct. 6. He was born and educated in Germany but left there in 1903 for Scotland where he worked as an electrical engineer. He joined Harnischfeger in 1911.

* * *

WORTHY CHANNING BUCKNAM, 86, pioneer gas welding and cutting equipment designer died Sept. 7. His long and colorful life included racing in Stanley Steamers and other early autos at the turn of the century. While working for Davis-Bournonville Co., he designed and patented the first portable flame-cutting and the first shape-cutting machines to be sold commercially in this country. For this work he was awarded the James T. Morehead medal by the International Acetylene Association in 1935. When the Davis-Bournonville Co. was dissolved in 1922, he joined Linde Air Products Co. and continued his welding development even after his official retirement in 1930.

* * *

EDWIN L. HETTINGER, director of optical research of Wilson Products, Inc., Reading, Pa., passed away on Sept. 2, 1951. He was instrumental in the development of the modern safety goggle and had contributed research on welding glass formulas to cut out ultraviolet and infrared rays.

Ingenious
New SMITH
"FLO-TROL"
eliminates
seat burn-out
NO MORE BURNED OUT CUTTING VALVE SEATS
NO MORE COSTLY DELAYS
Spring-loaded diaphragm prevents reverse flow of acetylene, protects torch against back-fire and burned out seats
Special new design permits rotating welding tip in any direction even while flame is burning!
No WRENCH needed. Finger-tip pressure on nut makes gas-tight seal
Seal rings keep gases separated until they reach proper place for mixing
Flexible insert in back-end of cutting assembly prevents leakage of high pressure oxygen
CARELESS OR INEXPERIENCED OPERATORS CANNOT HARM SEAT IN THIS NEW SMITH TORCH!
"FLO-TROL," an exclusive Smith feature, absolutely prevents reverse flow of acetylene to cutting valve seat area, thus eliminating danger of pre-mixing and pre-ignition. You can't go wrong. It's fool-proof. Take advantage of this technical achievement to reduce maintenance costs and eliminate production delays. This new Smith Torch with built-in protection really stays on the job . . . keeps production schedules rolling.
Equipment illustrated is Smith's LIFELONG Welding Torch Body with LIFELONG Cutting Assembly: Rugged and full size for general repair maintenance and manufacturing. Complete line of welding tips and special purpose tips is available with this model.
Smith's MIDLINE Welding & Cutting Equipment
Medium size and medium weight. Designed for production work and garage trade.
Smith's AIRLINE Welding & Cutting Equipment
Feather weight and small size. Ideal for light production, aircraft, body and fender work.
Smith's "FLO-TROL" also protects these two models.
SMITH
WELDING EQUIPMENT CORPORATION
Manufacturers of fine Welding Equipment for over 40 Years
SMITH WELDING EQUIPMENT CORP.
2635 S.E. 4th, Minneapolis, Minn.
Please send me more information on the time-saving and money-saving features of your new torch.
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Address
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State
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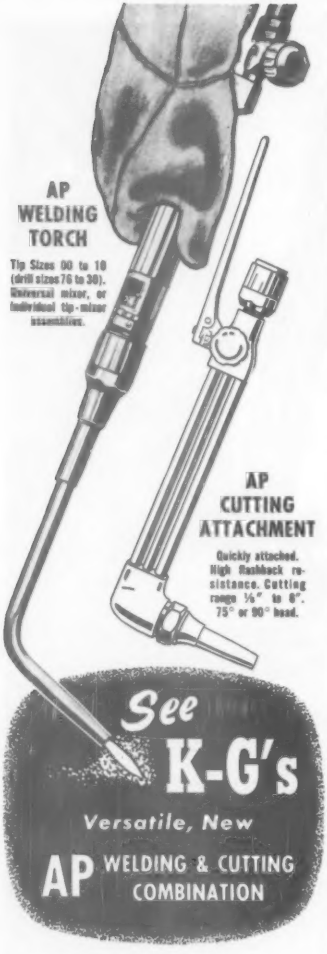

ALL PURPOSE. Takes a wide variety of tips. Excellent for brazing, welding, heating, cutting. Rugged, efficient, dependable.

ASK YOUR LOCAL K-G DISTRIBUTOR!*

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Also M3B Cutting Torches, Pressure Regulators, Complete Outfits, Cutting Machines, Accessories

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Unit of Air Products, Inc.

Dept. A, 50 Broadway, New York 4, New York

Book Reviews

Welding

RESISTANCE WELDING IN MASS PRODUCTION. By A. J. Hipperson and T. Watson. Published by Iliffe and Sons, Ltd., London, 1950. Cloth, 5½ x 8¾ in., 278 pages. Price $4.75.

This compact volume of ten chapters was planned to give the production man the information he is seeking as to what type of resistance-welding processes to employ and how to use it most advantageously. Spot, projection and seam welding are adequately covered, and considerable details are given on hot riveting and flash and butt welding.

Design of the component parts is considered particularly from the viewpoint of more satisfactory production from welding. The design of jigs and tools for welding is also discussed with mass production in mind.

Chapter 10 of the volume is devoted to resistance-welding costs. Since the material presented deals with the British labor market, it may be difficult to interpret it in terms of the higher American costs.

* * *

Civil Defense

CIVIL DEFENSE IN MODERN WARFARE. By Augustus M. Prentiss. Published by McGraw-Hill Book Co., Inc., New York, 1951. Cloth, 6 x 9 in., 429 pages. Price $6.

General Prentiss has written a vitally important and timely book covering every major aspect of civil defense against atomic, bacterial and chemical warfare. He has attempted: (1) to analyze the capabilities of modern air power, (2) to examine the effects of the new modes of scientific warfare and (3) to discuss the various defensive measures that should be taken to cope with the dangers presented by the new weapons.

The first of the three parts in which the volume is divided deals with modern air warfare and gives a comprehensive picture of the types of aircraft used in a modern war, including pilotless bombers and guided missiles. This part also discusses high explosives, poison gases, incendiary bombs, harmful bacteria and atomic bombs. Part two, on civil defense, presents methods of protecting industry, communities, homes and individuals against the destructive agents described in part one.

Organization for civil defense is covered in part three. This is a rather complete guide to a civil defense program for national, state and local government.

EXTRAORDINARY ANNOUNCEMENT

64 New Face Shields

We first originated face shields for skiing, ice boating, motorcycling, bob-sledding and other sports. Then we discovered that industry could use the face shield for face protection—and sales sky-rocketed.

Because of the great variety of industrial uses, considerable research was necessary before face shields could be designed to match the actual needs.

Since 1939 we have been steadily designing new shields. With this background of development work, we are now able to announce 64 new shields, each designed to fill an industrial need.

There are nine new styles, a completely new line of face shields, each style with clear and green windows in a wide variety of shapes, widths and lengths. All windows are replaceable and interchangeable and kept in place by a new improved fastener that works easier and holds more securely than the popular glove fastener.

The headgears are revolutionary in design. A special patented double-jointed hinge permits lowering or raising the window by a variation of two inches. What is still more revolutionary is a two-inch forward and backward movement. This permits the wearer to place the window close or far from the face.

Some shields are open at the top, while others have either a single or double cap. The double cap permits the wearer to decide how much of the fore-part of the head is to be covered.

These face shields are priced from $1.25 to $5.35 retail.

Ask Your Dealer to Show You Our New Carton With Illustrations of the New Shields on the Cover

If your dealer has not received a supply of the new face shields, please write us your face protection problems. We will then mail you three different shields for your inspection. Our direct price will include the packing and parcel post costs.

sellstrom

MANUFACTURING COMPANY

Sellstrom Safeguards Your Eyes and Face

626 North Aberdeen St., Chicago 22, Ill.

Furnaces

INDUSTRIAL FURNACES, Vol. I, 4th Edition. By W. Trinks. Published by John Wiley & Sons, New York, 1951. Cloth, 6 x 9 in., 526 pages. Price $10.

In the fourth edition of *Industrial Furnaces*, Professors Trinks has rewritten much of the text and provided many new illustrations to bring this treatise right up to today's practices. New scientific insights into heat transfer and furnace design are given as well as more practical principles of present-day design and operating methods.

Arrangement of the subject matter remains much the same as in the third edition except that infrequently used material has been moved to the index. The volume is divided into sections on the capacity, economic thermal efficiency, strength and durability of furnaces as well as the movement of gas in the furnace.

Conclusions are offered here that have been tested and proved in actual furnace practice. This research coupled with the basic text developed over the years makes the fourth edition extremely useful to designers and users of industrial furnaces.

* * *

Plating

ELECTRO-PLATING, 6th Edition. By Samuel Field and A. Dudley Weill. Published by Pitman Publishing Corp., New York, 1951. Cloth, 5 x 7½ in., 546 pages. Price $6.

This widely recognized work on electro-plating has been revised with up-to-date explanations and illustrations of the latest methods used in the industry. Also covered are the principles underlying modern processes and the plate and apparatus employed in each branch of the work.

Opening with the fundamental principles of chemistry and plating, the book then takes the reader into electricity and electro-chemistry. Subsequent chapters discuss chemical solutions, materials for plating, current sources and cleaning methods.

The story of plating is told in 12 chapters, two of which are devoted to copper, two to nickel and a chapter to each of the following metals: silver, gold, zinc, cadmium, chromium, various metals, aluminum, and magnesium.

The text will be found to be comprehensive, well illustrated and thoroughly practical. It is an essential guide to students of the plating industry, the practical plater and everyone else concerned with the technical aspects of the work.

SUBCONTRACTORS

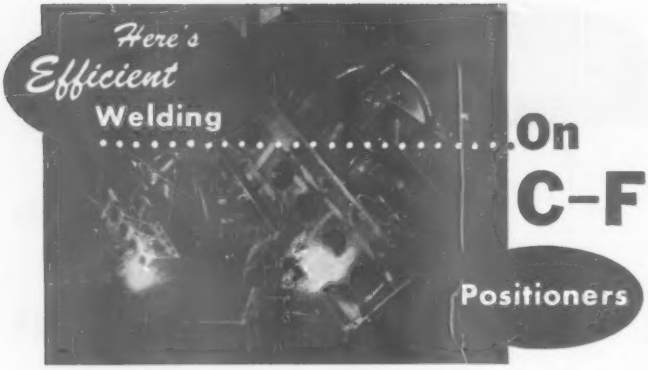
brazing essential aluminum assemblies should have the help of their

LOCAL ALCOA DISTRIBUTORS

For group instruction in brazing or welding aluminum, there's nothing like Alcoa's technical library . . . 4 how-to-do-it motion pictures, plus a 186-page book. Ask your Alcoa Distributor about them. You'll find him listed under "aluminum" in your classified phone book. Or write ALUMINUM COMPANY OF AMERICA, 1943M Gulf Building, Pittsburgh 19, Pennsylvania.

Complicated aluminum parts can be joined simultaneously and economically by brazing. See your local Alcoa Distributor.

ALCOA FIRST IN ALUMINUM



When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made **downhand**—that's efficient welding!

Weldors spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP24—an illustrated circular detailing the **Specific** advantages of C-F Positioners.

Cullen-Friestedt Co., 1309 S. Kilbourn Ave.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

Tractor Shoes Serve Longer

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REPAIR WORN TRACTOR GROUSERS with MANGANAL

U.S. Patents 1,876,738—197,167—2,021,945

11% - 13½% Manganese-Nickel Steel

SPECIAL SHAPE APPLICATOR BARS

1. USE MANGANAL ELECTRODES to rebuild worn Tractor Sprockets, Rollers and Idlers.
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3. Use MANGANAL FLAT APPLICATOR BARS to repair worn Bulldozer Corner Bits.
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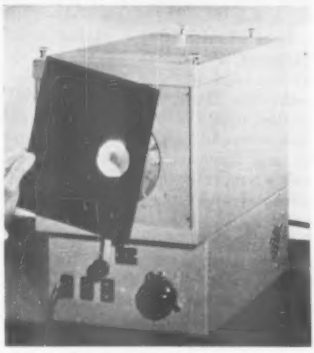
NAME OF NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO. SOLE PRODUCERS 92 N. J. Railroad Ave Newark 5, New Jersey

NEW PRODUCTS

(Continued from page 47)



Check X-Ray Films Closer with New Illuminator

A much wider range of X-ray film densities can now be studied by industrial radiographers with the aid of a new high-intensity viewer. The viewer has an iris diaphragm that opens from a ¼-in. triangle to a 5-in. circle. The light comes from a special 100,000-candlepower lamp, which has a life of 1,000 hr.

Film densities of from 0.5 to 4.5 can be penetrated with the new illuminator by using various combinations of iris opening and light. With only one exposure, the radiographer can now diagnose an object having different and greatly varying thicknesses.

Other advantages obtained with the new illuminator are: a reduction in man-hours required to take extra X-ray films, elimination of extra film cost and man-hours spent in viewing extras.

General Electric Co., X-Ray Dept., Milwaukee 14, Wis.

* * *

Hardening Compounds Applied with Torch

For emergency surface hardening of small tools or parts, Eutectic has two new compounds that can be applied with a welding torch. "Instant Hardner No. 1" is said to harden steel tools, parts, edges, threads, dies, drills, etc.

"Instant Hardner No. 2," applied the same as No. 1, is strengthened with small hard-facing particles mixed into the compound. When these hard particles are heated, they fuse with the parent metal to give a combination of hardening and hard overlay.

Eutectic Welding Alloys Corp., 172nd St. & Northern Blvd., Flushing 58, N. Y.

THE
ARC-FIT
PROCESS
Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"T" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today —also write for quotations.

VOGEL TOOL & DIE CORPORATION

1825 N. 32ND STREET
Dept. W-E
MELROSE PARK, ILL.

Spot Welding Tip Dresser Cleans Tips without Removal

A new electrode tip dresser for spot welding machines permits either straight or tapered electrodes to be dressed in seconds without removing them from the machine. The new dresser fits flush with the dressing tool; it can also be used with most power tools such as lathes, right angle drills and drill presses with a $\frac{3}{8}$-24 threaded extension.

The new dresser comes in two parts, the chuck and high-speed steel blade. Overall height is $\frac{3}{4}$ in. The blade floats in the chuck body providing uniform cutting action on both edges and correct centering of the electrode as the tip is reshaped.

C. O. PORTER MACHINERY CO., 666 Front Ave., N. W., Grand Rapids, Mich.

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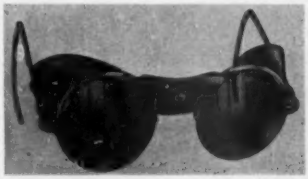


Take-Off Side Shields on New Weldor's Goggle

By removing endpiece screws, the side shields on a new weldor's goggle can be taken off for cleaning, sterilizing or replacement. Loosening the endpiece screws allows adjustment for fit and comfort, says the manufacturer.

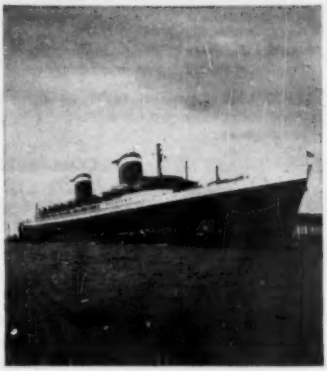
Designation of the goggle will be series 3081A, replacing the older AO series 3081 goggle. Side shields of the new goggle are made of soft leather to provide comfort and protection against heat, light and flying particles. The cylinder bridge and reinforcing bar are also covered with leather.

The soft leather side shields are also available for AO's No. 3080 weldor's goggle.

AMERICAN OPTICAL CO., Southbridge, Mass.

NEWPORT NEWS SHIPBUILDING KNOWS

Do You?



When the great, new superliner *United States* was warped out of the drydock of NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY she was on her way to becoming the most modern ship afloat. The latest advances of American industry were incorporated into the *United States*, the largest (990 ft. long) and fastest (30 knots plus) passenger ship ever built in this country.

Important among the advanced production processes used in construction of the vessel was Stud Welding. Aboard the *United States* KSM Solid-Fluxed Studs serve in many vital applications. NEWPORT NEWS, famed name in shipbuilding, knows well the value of Stud Welding.

Have you considered Stud Welding for **your** job? This modern method saves precious man hours in installation. And when the job is finished, the resulting weld makes a fastener that is strong and permanent in a manner that no other type of fastener can duplicate. For more information write for Bulletin 1012. KSM PRODUCTS, INC., MERCHANTVILLE, N. J.

An Unbeatable Combination!

SILVALOY SILVER BRAZING ALLOYS

The Silvaloy group consists of 7 popular silver brazing alloys high in tensile strength and producing strong, ductile joints on ferrous and non-ferrous metals.

	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1480 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

COMPLETE STOCKS

Oxy-acetelyne welding rods and flux for cast iron, steel, aluminum, brass, copper, bronze, nickel, monel and inconel.

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BRANCH PLANTS: Detroit, St. Louis • **BRANCH OFFICES:** Milwaukee, Minneapolis, Grand Rapids, Indianapolis, Kansas City, Mo.

Production Welders Locate and HOLD with "DE-STA-CO" clamps

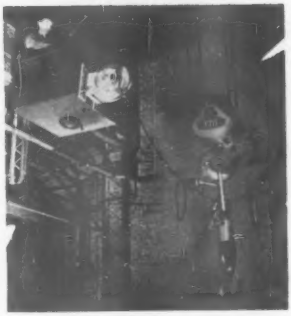
Revised 32-page catalog of toggle clamps, accessories, applications. Template sheets for efficient fixture design.

Precision clamp manufacture and high holding-pressures are the "secret" of this efficient welding fixture. Locating pins welded to clamp bars hold channels in positions to weld variable length assemblies in this versatile fixture. "De-Sta-Co" reamed holes and hardened pins assure accurate positioning of parts. Positive holding pressure forces cross members and plates into close contact essential for strong production welding. And "De-Sta-Co" quick toggle action makes loading a job untrained workers, even women operators, handle with ease, in seconds.

More than forty "De-Sta-Co" models—including new portable and plunger clamps—offer quick solutions to your locating and holding problems. The "De-Sta-Co" stocking distributor in your area is qualified to assist you; call him in, or, if you haven't met him, write for his name and your copy of our catalog, today.

DETROIT STAMPING COMPANY

372 MIDLAND AVE. • DETROIT 3, MICHIGAN



Electronic Scale Records, Prints Weights of Metal Parts

Many uses in the stores department, the fabricating shop and the shipping platform are foreseen for a new electronic scale attachment. Used with an overhead crane (see above) it will record and print automatically the exact weight (within 1/10 of 1%) of a welded component, a test load, a shipping container, etc. The weight is printed on a ticket, a tape or even a ledger remote from the scale, such as in the plant superintendent's office.

Principal operating parts of the new "Ametron" scale attachment have been service-tested for years. They include a Baldwin-Lima-Hamilton SR-4 strain gage apparatus, an amplifier, a motor and the famous Streeter-Amet "step cam" printer. No special maintenance personnel are needed for the very few times when any maintenance is indicated.

STREETER-AMET CO., 4101 Ravenswood Ave., Chicago 13.

• • •

Trouble-Shooting Ammeters Spot Current Losses

A new combination of a recording ammeter used portably with a clamp-ammeter can be used to check alternating current and circuit operations for wastage of power, time, money or labor. A permanent record is made that can be studied to show up improper handling of equipment, unwarranted use of power, unnecessary waste of production time, etc. Where multiple welding and power tool application are carried on, such a check may save considerable money. Combination pictured above is the "Tag" recording ammeter with a Weston clamp-ammeter Model 633, Type AIR-A2R.

TAGLIABUE INSTRUMENTS DIV., Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.

Nickel-Manganese Electrode Makes Fluxless Deposits

A SPECIAL nickel-manganese electrode has been developed for manganese steel parts that need joining or a build-up. Called "Dura-Latem No. 100," this electrode makes a deposit that is work-hardening.

Unusual feature in its operation is the elimination of slag cleaning. Though the rod is heavily coated, all flux products are consumed in the heat of the welding arc leaving none to be a bother. This feature is expected to double production, since usually cleaning a weld takes as long as making it.

PERMALATEM WELDING ALLOYS, INC., Neptune, N. J.

NEW PRODUCT BRIEFS

Automatic burn spray deposits a thin coating of topical anesthetic on burns, sunburn, itching eczema and wounds. Of the "Aerosol" bomb type, the spray is applied by pointing a nozzle on the bomb and pressing, a button. Americaine, Inc., 1316 Sherman Ave., Evanston, Ill.

* * *

Portable plastic drawing board is made from Bakelite styrene and measures 9¾ by 21¼ in. Corner clamps holds an 8½ by 11 in. paper sheet eliminating any tacks. Triangles can be stored in recesses underneath the transparent board. A. Partrick Co., 9 Grove St., Westwood, N. J.

* * *

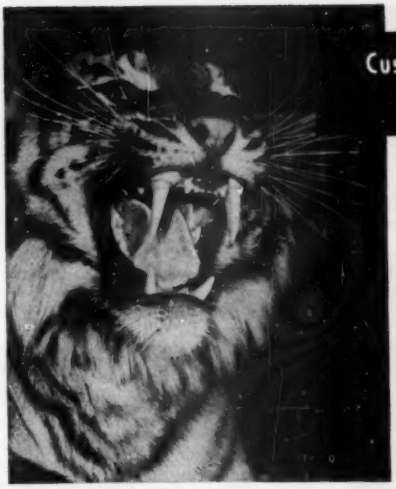
Handy, compact reference tables are wire-bound for easy folding. Screw dimension, tap and clearance drill sizes, natural functions of angles, formulas for areas and volumes, etc. are printed on heavy varnished cardboard. Called "Card-All", they are made by GENERAL DESIGN CO., 1200 Commercial Trust Bldg., Philadelphia 2.

* * *

GS safety spout stops splash and spilling when pouring from carboys. It fits any size of carboy and assures a smooth, even flow of acid. General Scientific Equipment Co., 27th & Huntingdon Sts., Philadelphia 32.

* * *

Concave roller conveyor was designed especially for handling cylindrical objects such as shells by The Alvey-Ferguson Co., 75 Disney St., Cincinnati 9. Objects being transported are kept in the center of the conveyor line and prevented from slipping to one side or sliding off.



Let us try to help you... Sometimes we can relieve the pressure of customer's demands by suggesting alternate material or production changes which will help you get more use from the steel you use. Whatever your steel problem may be, why not put it up to United States Steel Supply?

UNITED STATES STEEL SUPPLY COMPANY

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USS

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Solve Your Welding Problems
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Spot
Butt
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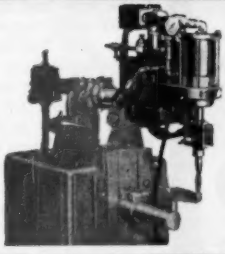
USED
REBUILT



WELD-AIR-MATIC

Spot welder air conversion unit. Tests prove 10,000 welds hourly on continuous daily schedules.

BUTT-ON-SPOT

Automatic butt welding attachment. Water-cooled, fits any spot welder with minimum horn clearance of 7".

DIES: complete facilities to design and build special welding dies and fixtures for your piece parts.

ACCESSORIES: complete stock of Welder Controls, Holders, Tips, and Bar Stock.

Write for our current available Welder List.

ROBT. W. HOFFMAN COMPANY, INC.

40 S. Clinton Street Chicago 6, Ill.

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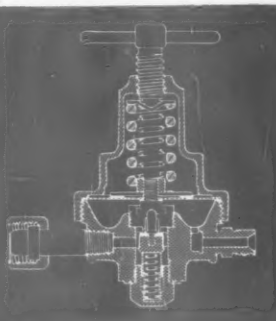
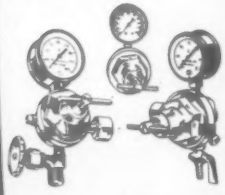


in types for Oxygen, Acetylene, CO_2, Air, Fuel Gases.

"BUILT FOR BETTER SERVICE" with improved diaphragms, replaceable, self-aligning seats; sturdier construction; shatter-saf gauges; alert safety valves and other advantages.



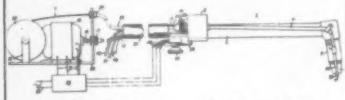
THERE IS A DOCKSON DISTRIBUTOR NEAR YOU—Let us send you his name and our complete catalog of DOCKSON WELDING and CUTTING EQUIPMENT.

Dockson CORPORATION
3639 WABASH • DETROIT 8, MICH.

From the Patent Office

Automatic Inert-Arc Torch

2,571,684. KENNETH C. CRAVEN, Fitchburg, Mass. Assigned to General Electric Co. Filed Dec. 31, 1949. Granted Oct. 16, 1951.



Patent refers to a hand torch for inert arc welding in which a filler wire is added to the parent metal at the weld zone. The torch comprises a handle and a nozzle angularly disposed on the front end of the handle. Means extending lengthwise of the handle establish a heating agency at the tip of the nozzle. Flexible connections extend from the rear end of the handle to the heating element from a supply located away from the torch. An enclosure is mounted on the rear end of the handle beyond the hand grip. A wire feeding mechanism in the enclosure has a drive shaft that extends from it. A motor supported at a point remote from the torch drives a flexible shaft that operates the wire feed mechanism. A flexible wire guide extends from the enclosure and the feed mechanism to a supply of filler wire. A wire guide extends along the torch from the enclosure and the feed mechanism to the tip part of the nozzle. The wire guide conforms to the contour of the torch. It has a delivery end part extending along the outside of the nozzle and terminating in a curved end that is turned inwardly toward the center of the tip part of the nozzle.

• • •

Continuous-Electrode Coating

2,569,030. RUSSEL V. VANDEN BERG, New Kensington, Pa. Assigned to Aluminum Company of America, Pittsburgh. Filed April 19, 1950. Granted Sept. 25, 1951.

Patent covers a method of preparing aluminum wire for use as the continuous electrode in an inert-gas-shielded arc welding process. It comprises coating the wire by immersion in an aqueous solution of alkali zincate and thereafter removing the coating formed in the zincate by immersion in an acid stripping solution.

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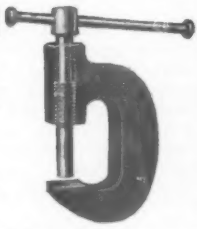

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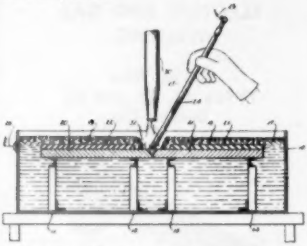
Protecting Weldment from Heat

2,572,796. HARRY W. WOODARD, Akron, O. Assigned to the B. F. Goodrich Co. Filed June 23, 1948. Granted Oct. 23, 1951.

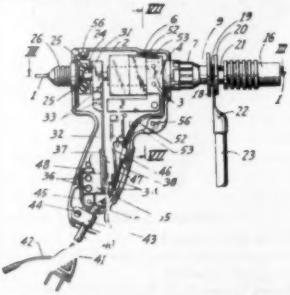


Patent refers to an apparatus for protecting from heat certain portions of a weldment. The equipment includes a bath of cooling liquid with a support beneath the surface for holding the workpiece at a workable level. The depth of liquid over the workpiece is sufficiently shallow to permit localized displacement of it at the weld by a stream of gas directed against the top of the workpiece. The support is connected electrically to one pole of a source of electric current. A jet nozzle above the cooling bath is placed above the bath and directed at the surface in the region of the desired weld. A welding electrode is connected to the opposite source of electric current so that it may be manipulated in the area where the liquid is displaced.

* * *

Welding Electrode Holder

2,572,084. CHARLES K. WILSON, East Williston, N. Y. Assigned to Metallizing Engineering Co., Inc., Long Island City, N. Y. Filed Dec. 7, 1948. Granted Oct. 23, 1951.



Newly patented electrode holder has an electric coil mounted on it in fixed relation to the holding means. A magnetizable armature is positioned relative to the coil to be magnetized upon energization of the coil. The armature is resiliently mounted for oscillation on the holder at a pretuned frequency of oscillation.

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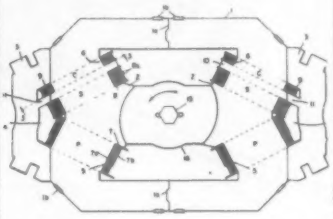
Arc Welder

2,569,476. GEORGE G. LANDIS, South Euclid, O., and NORMAN J. HOENIE, Cleveland Heights, O. Assigned to The Lincoln Electric Co., Cleveland. Filed Aug. 7, 1944. Granted Oct. 2, 1951.

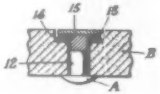


This patent covers the design of an arc welder having a transformer with a stator body of hollow form. The stator has an inwardly directed pole-providing projection. A movable member is adapted to cooperate with the projection to form a variable magnetic bridge. An extension of the stator body encloses a space opposite the projection. Primary and secondary windings encircle the stator next to the projection. The windings lie in part in the space thus provided. The extension together with either adjacent lateral part of the body provides a flux path substantially equivalent to that provided by the body where encircled by the windings.

* * *

Welded Rivet Electrical Contact

2,569,059. MELVIN O. HUFF, Fostoria, and ARTHUR W. SEIDLER, Cleveland. Assigned by mesne assignments to Union Carbide and Carbon Corp., New York City. Filed Dec. 18, 1947. Granted Sept. 25, 1951.



This patent refers to a frangible electrical contact brush having a conductor in contact with it. A resistance welded structure comprising a first enlarged end portion bears against a surface of the brush. An intermediate shank part extends through a hole in the brush and in the conductor. A second enlarged end part bears against the conductor. The resistance weld in the structure is in electrical contact with but not welded to the conductor. Under the influence of residual tension the complementary pressure exerted by the welded structure upon the conductor and the brush is sufficient to establish good electrical contact.

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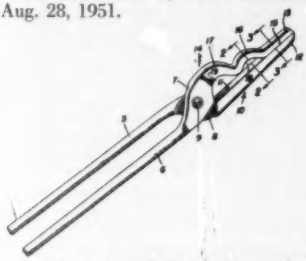
Jaws for Welding Tongs

2,565,750. Louis R. Bertino, Sidney, Mont. Filed Oct. 3, 1947. Granted Aug. 28, 1951.

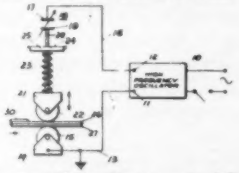


Newly patented bench tongs for welders are said to hold a work piece securely though operated by only one hand. The tongs have a pair of crossed straight handles pivotally connected. The parts outward of the pivot constitute the work holding parts. One jaw has an uninterrupted straight edged work-basing and clamping surface. The surface is in a plane parallel with the plane of the handles. The other jaw has a straight elongated terminal portion at its outer end adapted to firmly contact the corresponding end of the work-basing surface. The latter jaw also has progressivly enlarged transverse longitudinally spaced bends.

* * *

Welding Thermoplastics

2,572,226. John E. Walstrom, Diablo, Calif. Assigned to Raytheon Mfg. Co., Newton, Mass. Filed April 24, 1947. Granted Oct. 23, 1951.



For welding plastic materials, a new apparatus includes a pair of metal electrodes spring-mounted to press against each other. The plastic materials (dielectrics) to be heated are passed between the electrodes. A source of high frequency oscillatory energy controlled by a variable condenser is connected to the electrodes. The condenser has an average capacitance approximating the average across the electrodes with the plastic material between them. The condenser has one electrode which is movable to vary the spacing between them. One of the heating electrodes is mechanically connected to one condenser electrode to decrease the spacing between the condenser electrodes as the spacing between the metal electrodes increases.

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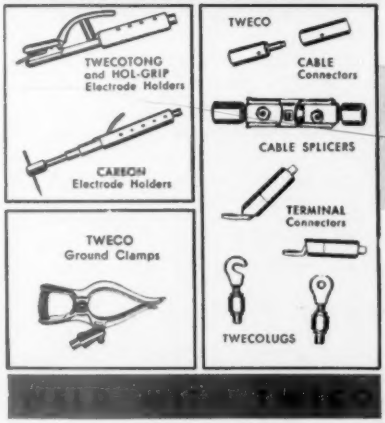

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